UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM 10-Q

(Mark One)

☒ **QUARTERLY REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the quarterly period ended March 28, 2020

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from __________ to __________

Commission file number: 001-32598

Entegris, Inc.
(Exact name of registrant as specified in its charter)

Delaware	**41-1941551**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
129 Concord Road, Billerica, Massachusetts	**01821**
(Address of principal executive offices)	**(Zip Code)**

(978) 436-6500
(Registrant's telephone number, including area code)

None
(Former name, former address and former fiscal year, if changed since last report)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common stock, $0.01 par value per share	**ENTG**	**The Nasdaq Stock Market LLC**

Indicate by check mark whether the registrant: (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of April 17, 2020, there were 134,606,530 shares of the registrant’s common stock outstanding.

ENTEGRIS, INC. AND SUBSIDIARIES
FORM 10-Q
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FOR THE QUARTER ENDED MARCH 28, 2020

Cautionary Statements

This Quarterly Report on Form 10-Q contains “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. The words “believe,” “expect,” “anticipate,” “intend,” “estimate,” “forecast,” “project,” “should,” “may,” “will,” “would” or the negative thereof and similar expressions are intended to identify such forward-looking statements. These forward-looking statements may include statements about future period guidance or projections; the Company’s performance relative to its markets; market and technology trends, including the duration and drivers of any growth trends and the impact of the COVID-19 pandemic; the development of new products and the success of their introductions; the focus of the Company’s engineering, research and development projects; the Company’s ability to execute on its business strategies; the Company’s capital allocation strategy, which may be modified at any time for any reason, including share repurchases, dividends, debt repayments and potential acquisitions; the effect of the Tax Cuts and Jobs Act; the impact of the acquisitions the Company has made and commercial partnerships the Company has established; future capital and other expenditures, including estimates thereof; the Company’s expected tax rate; the impact, financial or otherwise, of any organizational changes; the impact of accounting pronouncements; quantitative and qualitative disclosures about market risk; and other matters. These forward-looking statements are based on current management expectations and assumptions only as of the date of this Quarterly Report, are not guarantees of future performance and involve substantial risks and uncertainties that are difficult to predict and that could cause actual results to differ materially from the results expressed in, or implied by, these forward-looking statements. These risks and uncertainties include, but are not limited to, weakening of global and/or regional economic conditions, generally or specifically in the semiconductor industry, which could decrease the demand for the Company’s products and solutions; risks related to the COVID-19 pandemic on the global economy and financial markets, as well as on the Company, our customers and suppliers, which may impact our sales, gross margin, customer demand and our ability to supply our products to our customers; the Company’s ability to meet rapid demand shifts; the Company’s ability to continue technological innovation and introduce new products to meet customers’ rapidly changing requirements; the Company’s concentrated customer base; the Company’s ability to identify, effect and integrate acquisitions, joint ventures or other transactions; the Company’s ability to effectively implement any organizational changes; the Company’s ability to protect and enforce intellectual property rights; operational, political and legal risks of the Company’s international operations; the Company’s dependence on sole source and limited source suppliers; the increasing complexity of certain manufacturing processes; raw material shortages, supply constraints and price increases; changes in government regulations of the countries in which the Company operates; fluctuation of currency exchange rates; fluctuations in the market price of the Company's stock; the level of, and obligations associated with, the Company's indebtedness; and other risk factors and additional information described in the Company's filings with the Securities and Exchange Commission, including under the heading "Risks Factors" in Item 1A of the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2019, filed on February 7, 2020, under the heading "Risk Factors" in Item 1A of this Quarterly Report and in the Company's other periodic filings. Except as required under the federal securities laws and the rules and regulations of the Securities and Exchange Commission, the Company undertakes no obligation to update publicly any forward-looking statements or information contained herein, which speak as of their respective dates.

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PART 1. FINANCIAL INFORMATION
Item 1. Financial Statements

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited)

(In thousands, except share and per share data)	March 28, 2020	December 31, 2019
ASSETS		
Current assets:		
Cash and cash equivalents	$ 335,077	$ 351,911
Trade accounts and notes receivable, net of allowance for doubtful accounts of $2,304 and $1,145	277,796	234,409
Inventories, net	300,694	287,098
Deferred tax charges and refundable income taxes	25,650	24,552
Other current assets	27,089	34,427
Total current assets	966,306	932,397
Property, plant and equipment, net of accumulated depreciation of $540,013 and $522,424	474,841	479,544
Other assets:		
Right-of-use assets	50,058	50,160
Goodwill	726,234	695,044
Intangible assets, net of accumulated amortization of $424,462 and $409,328	355,815	333,952
Deferred tax assets and other noncurrent tax assets	11,563	11,245
Other	13,748	13,744
Total assets	$ 2,598,565	$ 2,516,086
LIABILITIES AND EQUITY		
Current liabilities:		
Long-term debt, current maturities	$ 4,000	$ 4,000
Accounts payable	81,561	84,207
Accrued payroll and related benefits	29,590	62,340
Other accrued liabilities	60,857	87,778
Income taxes payable	25,982	26,108
Total current liabilities	201,990	264,433
Long-term debt, excluding current maturities, net of unamortized discount and debt issuance costs of $9,112 and $9,516	1,074,888	932,484
Pension benefit obligations and other liabilities	35,295	37,867
Deferred tax liabilities and other noncurrent tax liabilities	71,516	71,586
Long-term lease liability	43,549	43,827
Commitments and contingent liabilities	—	—
Equity:		
Preferred stock, par value $.01; 5,000,000 shares authorized; none issued and outstanding as of March 28, 2020 and December 31, 2019	—	—
Common stock, par value $.01; 400,000,000 shares authorized; issued and outstanding shares as of March 28, 2020: 134,808,929 and 134,606,529, respectively; issued and outstanding shares as of December 31, 2019: 134,929,768 and 134,727,368, respectively	1,348	1,349
Treasury stock, at cost: 202,400 shares held as of March 28, 2020 and December 31, 2019	(7,112)	(7,112)
Additional paid-in capital	833,159	842,784
Retained earnings	390,542	366,127
Accumulated other comprehensive loss	(46,610)	(37,259)
Total equity	1,171,327	1,165,889
Total liabilities and equity	$ 2,598,565	$ 2,516,086

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited)

(In thousands, except per share data)	Three months ended March 28, 2020	Three months ended March 30, 2019
Net sales	$ 412,327	$ 391,047
Cost of sales	226,849	213,654
Gross profit	185,478	177,393
Selling, general and administrative expenses	58,891	82,254
Engineering, research and development expenses	29,632	28,991
Amortization of intangible assets	16,211	18,657
Operating income	80,744	47,491
Interest expense	10,559	10,884
Interest income	(321)	(1,225)
Other expense (income), net	878	(248)
Income before income tax expense	69,628	38,080
Income tax expense	8,622	5,422
Net income	$ 61,006	$ 32,658
Basic net income per common share	$ 0.45	$ 0.24
Diluted net income per common share	$ 0.45	$ 0.24
Weighted shares outstanding:		
Basic	134,745	135,299
Diluted	136,369	136,692

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(Unaudited)

	Three months ended	
(In thousands)	**March 28, 2020**	**March 30, 2019**
Net income	$ 61,006	$ 32,658
Other comprehensive loss, net of tax		
Foreign currency translation adjustments	(9,361)	(2,787)
Pension liability adjustments	10	24
Other comprehensive loss	(9,351)	(2,763)
Comprehensive income	$ 51,655	$ 29,895

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES

CONDENSED CONSOLIDATED STATEMENTS OF EQUITY

(Unaudited)

(In thousands)	Common shares outstanding	Common stock	Treasury shares	Treasury stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Defined benefit pension adjustments	Total
Balance at December 31, 2018	136,179	$ 1,362	(202)	$ (7,112)	$ 837,658	$ 213,753	$ (32,776)	$ (860)	$ 1,012,025
Shares issued under stock plans	572	5	—	—	(6,817)	—	—	—	(6,812)
Share-based compensation expense	—	—	—	—	4,653	—	—	—	4,653
Repurchase and retirement of common stock	(1,035)	(10)	—	—	(6,364)	(23,413)	—	—	(29,787)
Dividends declared ($0.07 per share)	—	—	—	—	7	(9,517)	—	—	(9,510)
Pension liability adjustment	—	—	—	—	—	—	—	24	24
Foreign currency translation	—	—	—	—	—	—	(2,787)	—	(2,787)
Net income	—	—	—	—	—	32,658	—	—	32,658
Balance at March 30, 2019	135,716	$ 1,357	(202)	$ (7,112)	$ 829,137	$ 213,481	$ (35,563)	$ (836)	$ 1,000,464

(In thousands)	Common shares outstanding	Common stock	Treasury shares	Treasury stock	Additional paid-in capital	Retained earnings (deficit)	Foreign currency translation adjustments	Defined benefit pension adjustments	Total
Balance at December 31, 2019	134,930	$ 1,349	(202)	$ (7,112)	$ 842,784	$ 366,127	$ (36,468)	$ (791)	$ 1,165,889
Shares issued under stock plans	483	5	—	—	(10,894)	—	—	—	(10,889)
Share-based compensation expense	—	—	—	—	4,994	—	—	—	4,994
Repurchase and retirement of common stock	(604)	(6)	—	—	(3,740)	(25,818)	—	—	(29,564)
Dividends declared ($0.08 per share)	—	—	—	—	15	(10,773)	—	—	(10,758)
Pension liability adjustment	—	—	—	—	—	—	—	10	10
Foreign currency translation	—	—	—	—	—	—	(9,361)	—	(9,361)
Net income	—	—	—	—	—	61,006	—	—	61,006
Balance at March 28, 2020	134,809	$ 1,348	(202)	$ (7,112)	$ 833,159	$ 390,542	$ (45,829)	$ (781)	$ 1,171,327

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited)

	Three months ended	
(In thousands)	**March 28, 2020**	**March 30, 2019**
Operating activities:		
Net income	$ 61,006	$ 32,658
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation	20,648	16,721
Amortization	16,211	18,657
Share-based compensation expense	4,994	4,653
Provision for deferred income taxes	(64)	6
Other	5,627	5,688
Changes in operating assets and liabilities:		
Trade accounts and notes receivable	(43,995)	(9,109)
Inventories	(18,205)	(2,131)
Accounts payable and accrued liabilities	(38,020)	(45,019)
Other current assets	5,825	17,778
Income taxes payable and refundable income taxes	(225)	(42,873)
Other	(2,399)	433
Net cash provided by (used in) operating activities	11,403	(2,538)
Investing activities:		
Acquisition of property, plant and equipment	(22,585)	(34,465)
Acquisition of businesses, net of cash acquired	(75,630)	(49,789)
Other	5	197
Net cash used in investing activities	(98,210)	(84,057)
Financing activities:		
Proceeds from short-term borrowings and long-term debt	217,000	—
Payments of long-term debt	(75,000)	(1,000)
Payments for dividends	(10,847)	(9,470)
Issuance of common stock	551	917
Repurchase of common stock	(29,564)	(35,321)
Taxes paid related to net share settlement of equity awards	(11,440)	(7,727)
Deferred acquisition payments	(16,125)	—
Other	(2,890)	(250)
Net cash provided by (used in) financing activities	71,685	(52,851)
Effect of exchange rate changes on cash and cash equivalents	(1,712)	(256)
Decrease in cash and cash equivalents	(16,834)	(139,702)
Cash and cash equivalents at beginning of period	351,911	482,062
Cash and cash equivalents at end of period	$ 335,077	$ 342,360

Supplemental Cash Flow Information **(unaudited)** ***(In thousands)***	**Three months ended**	
	March 28, 2020	**March 30, 2019**
Non-cash transactions:		
Deferred acquisition payments	$ 1,451	$ 14,001
Contingent consideration obligation	$ —	$ 686
Equipment purchases in accounts payable	$ 6,689	$ 7,486
Dividends payable	$ 89	$ 65
Schedule of interest and income taxes paid:		
Interest paid	$ 15,296	$ 17,124
Income taxes paid, net of refunds received	$ 7,997	$ 47,770

See the accompanying notes to condensed consolidated financial statements.

ENTEGRIS, INC. AND SUBSIDIARIES
NOTES TO CONDENSED CONSOLIDATED FINANCIAL STATEMENTS
(Unaudited)

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations Entegris, Inc. (“Entegris”, “the Company”, “us”, “we”, or “our”) is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries.

Principles of Consolidation The condensed consolidated financial statements include the accounts of the Company and its majority-owned subsidiaries. Intercompany profits, transactions and balances have been eliminated in consolidation.

Use of Estimates The preparation of condensed consolidated financial statements in conformity with accounting principles generally accepted in the United States requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, particularly receivables, inventories, property, plant and equipment, right-of-use assets, goodwill, intangibles, accrued expenses, short-term and long-term lease liability, income taxes and related accounts, and disclosure of contingent assets and liabilities at the date of the condensed consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Basis of Presentation The condensed consolidated financial statements have been prepared in accordance with accounting principles generally accepted in the United States and contain all adjustments considered necessary, and are of a normal recurring nature, to present fairly the financial position as of March 28, 2020 and December 31, 2019, and the results of operations and comprehensive income for the three months ended March 28, 2020 and March 30, 2019, the equity statements as of and for the three months ended March 28, 2020 and March 30, 2019, and cash flows for the three months ended March 28, 2020 and March 30, 2019.

The condensed consolidated financial statements and accompanying notes are presented as permitted by Form 10-Q and do not contain certain information included in the Company’s annual consolidated financial statements and notes. The information included in this Form 10-Q should be read in conjunction with Management’s Discussion and Analysis and consolidated financial statements and notes thereto included in the Company’s Form 10-K for the year ended December 31, 2019. The results of operations for the three months ended March 28, 2020 are not necessarily indicative of the results to be expected for the full year.

Fair Value of Financial Instruments The carrying value of cash equivalents, accounts receivable, accounts payable, accrued payroll and related benefits, and other accrued liabilities approximates fair value due to the short maturity of those items. The fair value of long-term debt, including current maturities, was $1,014.8 million at March 28, 2020, compared to the carrying amount of long-term debt, including current maturities, of $1,078.9 million at March 28, 2020.

Recent Accounting Pronouncements Adopted in 2020 In June 2016, the FASB issued ASU 2016-13, Financial Instruments - Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments. ASU 2016-13 changes the impairment model for most financial assets and certain other instruments. For trade and other receivables, held-to-maturity debt securities, loans and other instruments, entities are required to use a new forward-looking “expected loss” model that replaces the current “incurred loss” model and generally will result in the earlier recognition of allowances for losses.

The Company adopted ASU No. 2016-13 on January 1, 2020, and there was no material effect on its condensed consolidated financial statements.

Recent Accounting Pronouncements
In December 2019, the FASB issued ASU No. 2019-12, “Simplifying the Accounting for Income Taxes” under ASC 740, which simplifies the accounting for income taxes by removing certain exceptions to the general principles in Topic 740 and amends existing guidance to improve consistent application. This guidance is effective for fiscal years beginning after December 15, 2021, including interim periods within that fiscal year. Early adoption is permitted. The Company is in the process of evaluating the impacts of this guidance on its consolidated financial statements and related disclosures.

2. REVENUES

Revenue Recognition Revenue is measured based on consideration specified in a contract with a customer, and excludes any sales incentives and amounts collected on behalf of third parties. The Company recognizes revenue when it satisfies a performance obligation by transferring control over a product or service to a customer.

Taxes assessed by a governmental authority that are both imposed on and concurrent with a specific revenue-producing transaction, that are collected by the Company from a customer, are excluded from revenue.

Shipping and handling costs associated with outbound freight after control over a product has transferred to a customer are accounted for as a fulfillment cost and are included in cost of goods sold.

The Company recognizes the incremental costs of obtaining contracts as an expense when incurred if the amortization period of the assets that the Company otherwise would have recognized is one year or less.

When the Company receives consideration, or such consideration is unconditionally due, from a customer prior to transferring goods or services to the customer under the terms of a sales contract, the Company records deferred revenue, which represents a contract liability. Such deferred revenue typically results from advance payments received on sales of the Company's products. The Company makes the required disclosures below.

The Company does not disclose information about remaining performance obligations that have original expected durations of one year or less.

Nature of goods and services The following is a description of principal activities from which the Company generates its revenues. The Company has three reportable segments. For more detailed information about reportable segments, see note 9 to the condensed consolidated financial statements. For each of the three reportable segments, the recognition of revenue regarding the nature of goods and services provided by the segments are similar and described below. The Company recognizes revenue for product sales at a point in time following the transfer of control of such products to the customer, which generally occurs upon shipment or delivery, depending on the terms of the underlying contracts. For product sales contracts that contain multiple performance obligations, the Company allocates the transaction price to each performance obligation identified in the contract based on relative standalone selling prices, or estimates of such prices, and recognizes the related revenue as control of each individual product is transferred to the customer, in satisfaction of the corresponding performance obligations.

The Company generally recognizes revenue for sales of services when the Company has satisfied the performance obligation.

The Company also enters into arrangements to license its intellectual property. These arrangements typically permit the customer to use a specialized manufacturing process and in return the Company receives a royalty fee. If applicable, the Company recognizes revenue when the subsequent sale or usage occurs.

The Company offers certain customers cash discounts and volume rebates as sales incentives. The discounts and volume rebates are recorded as a reduction in sales at the time revenue is recognized in an amount estimated based on historical experience and contractual obligations. The Company periodically reviews the assumptions underlying its estimates of discounts and volume rebates and adjusts its revenues accordingly.

In addition, the Company offers free product rebates to certain customers. The Company utilizes an adjusted market approach to estimate the stand-alone selling price of the loyalty program and allocates a portion of the consideration received to the free product offering. The free product offering is redeemable upon future purchases of the Company's products. The amount associated with free product rebates is deferred in the balance sheet and is recognized as revenue when the free product is redeemed or when the likelihood of redemption is remote. The Company deems the amount immaterial for disclosure.

The Company provides for the estimated costs of fulfilling our obligations under product warranties at the time the related revenue is recognized. The Company estimates the costs based on historical failure rates, projected repair costs, and knowledge of specific product failures (if any). The specific warranty terms and conditions vary depending upon the product sold and the country in which we do business, but generally include parts and labor over a period generally ranging from 90 days to one year. The Company regularly reevaluates its estimates to assess the adequacy of the recorded warranty liabilities and adjust the amounts as necessary.

The Company's contracts are generally short-term in nature. Most contracts do not exceed twelve months. Payment terms vary by the type and location of the Company's customers and the products or services offered. The term between invoicing and when payment is due is not significant. For certain products or services and customer types, the Company requires payment before the products or services are delivered to the customer. Those customers that prepay are represented by the contract liabilities below until the performance obligations are satisfied.

The following table provides information about contract liabilities from contracts with customers. The contract liabilities are included in other accrued liabilities balance in the condensed consolidated balance sheet.

(In thousands)	March 28, 2020	December 31, 2019
Contract liabilities - current	$ 10,610	$ 13,022

Significant changes in the contract liabilities balances during the period are as follows:

(In thousands)	Three months ended March 28, 2020
Revenue recognized that was included in the contract liability balance at the beginning of the period	$ (7,596)
Increases due to cash received, excluding amounts recognized as revenue during the period	5,184

3. ACQUISITIONS

Sinmat

On January 10, 2020, the Company acquired Sinmat, a chemical mechanical polishing slurry manufacturer. Sinmat reports into the Specialty Chemicals and Engineered Material segment of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of Sinmat are included in the Company's condensed consolidated financial statements as of and since January 10, 2020. Costs associated with the acquisition of Sinmat were $0.7 million for the three months ended March 28, 2020 and were expensed as incurred. These costs are included in the selling, general and administrative expenses in the Company's condensed consolidated statement of operations. The acquisition does not constitute a material business combination.

The purchase price for Sinmat includes cash consideration of $76.2 million, or $75.6 million net of cash acquired (subject to revision for certain adjustments), which was funded from the Company's existing cash on hand.

The purchase price of Sinmat exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $31.8 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be non-deductible for income tax purposes.

The following table summarizes the provisional allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the acquisition date:

(In thousands):	As of January 10, 2020
Trade accounts and note receivable, net	$ 1,189
Inventories, net	1,010
Other current assets	8
Property, plant and equipment	63
Identifiable intangible assets	41,680
Right-of-use assets	1,712
Accounts payable and accrued liabilities	(58)
Short-term lease liability	(150)
Long-term lease liability	(1,562)
Net assets acquired	43,892
Goodwill	31,751
Total purchase price, net of cash acquired	$ 75,643

The Company recognized the following finite-lived intangible assets as part of the acquisition of Sinmat:

(In thousands)	Amount	Weighted average life in years
Developed technology	$ 7,650	7.0
Trademarks and trade names	130	1.3
Customer relationships	33,900	15.0
	$ 41,680	13.5

The final valuation of assets acquired and liabilities assumed is expected to be completed as soon as possible, but not later than one year from the acquisition date. The allocation of the purchase price to the assets acquired and the liabilities assumed is complete with the exception of the value allocated to income tax and intangible accounts. To the extent that the Company's estimates require adjustment, the Company will modify the values.

Hangzhou Anow Microfiltration Co., Ltd.

On September 17, 2019, the Company acquired Hangzhou Anow Microfiltration Co., Ltd. (Anow), a filtration company for diverse industries including semiconductor, pharmaceutical, and medical. Anow reports into the Microcontamination Control segment of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of Anow are included in the Company's condensed consolidated financial statements as of and since September 17, 2019. The acquisition does not constitute a material business combination.

The purchase price for Anow is $72.8 million, net of cash acquired. The purchase price includes (1) cash consideration of $73.0 million, or $69.3 million net of cash acquired (subject to revision for certain adjustments), which was funded from the Company's existing cash on hand, and (2) $3.5 million deferred payment due to the seller no earlier than September 18, 2021, at which time either the seller of the Company can exercise its option to receive or pay the deferred payment, respectively.

The purchase price of Anow exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $49.6 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be non-deductible for income tax purposes.

The following table summarizes the provisional allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the acquisition date and as adjusted as of March 28, 2020:

(In thousands):	As of September 17, 2019	As of March 28, 2020
Trade accounts and note receivable, net	$ 3,455	$ 3,455
Inventories, net	4,242	4,459
Other current assets	202	794
Property, plant and equipment	8,863	8,257
Identifiable intangible assets	42,179	16,439
Right-of-use assets	—	2,328
Other noncurrent assets	1,565	74
Accounts payable and accrued liabilities	(1,814)	(5,022)
Short-term lease liability	—	(88)
Long-term lease liability	—	(107)
Noncurrent deferred tax liabilities	(10,890)	(4,129)
Other noncurrent liabilities	—	(3,270)
Net assets acquired	47,802	23,190
Goodwill	25,212	49,608
Total purchase price, net of cash acquired	$ 73,014	$ 72,798

The change in the allocation of purchase price is due to the acquisition occurring near the quarter end date of September 29, 2019 which required an estimated allocation of values.

The Company recognized the following finite-lived intangible assets as part of the acquisition of Anow:

(In thousands)	Amount	Weighted average life in years
Developed technology	$ 6,764	6.8
Trademarks and trade names	2,019	7.3
Customer relationships	7,656	14.3
	$ 16,439	10.3

The final valuation of assets acquired and liabilities assumed is expected to be completed as soon as possible, but not later than one year from the acquisition date. The allocation of the purchase price to the assets acquired and the liabilities assumed is complete with the exception of the value allocated to income tax accounts. To the extent that the Company's estimates require adjustment, the Company will modify the values.

MPD Chemicals

On July 15, 2019, the Company acquired MPD Chemicals (MPD), a provider of advanced materials to the specialty chemical, technology, and life sciences industries. MPD reports into the Specialty Chemicals and Engineered Material segment of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of MPD are included in the Company's condensed consolidated financial statements as of and since July 15, 2019. The acquisition does not constitute a material business combination.

The purchase price for MPD is $162.4 million, net of cash acquired. The purchase price includes (1) cash consideration of $157.9 million (subject to revision for customary working capital adjustments), which was funded from the Company's existing cash on hand, and (2) a fixed deferred payment of $5.0 million that is due on January 15, 2022, recorded at $4.5 million, which represents the fair value of this fixed deferred payment as of the acquisition date.

The fair value of the fixed deferred payment was determined by taking the present value of this fixed deferred payment based on the term and a discount factor. The fixed deferred payment is reflected in pension benefit obligations and other liabilities in the Company's condensed consolidated balance sheets.

The purchase price of MPD exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $63.0 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be deductible for income tax purposes.

The following table summarizes the provisional allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the acquisition date and adjusted as of March 28, 2020:

(In thousands):	As of July 15, 2019	As of March 28, 2020
Trade accounts and note receivable, net	$ 3,575	$ 3,575
Inventories, net	21,899	8,689
Other current assets	318	313
Property, plant and equipment	14,571	11,465
Identifiable intangible assets	74,900	79,390
Right-of-use assets	3,677	3,621
Accounts payable and accrued liabilities	(2,440)	(2,153)
Short-term lease liabilities	(144)	(88)
Long-term lease liabilities	(4,016)	(4,016)
Other noncurrent liabilities	(1,416)	(1,416)
Net assets acquired	110,924	99,380
Goodwill	51,457	63,042
Total purchase price, net of cash acquired	$ 162,381	$ 162,422

The Company recognized the following finite-lived intangible assets as part of the acquisition of MPD:

(In thousands)	Amount	Weighted average life in years
Developed technology	$ 12,750	11.0
Trademarks and trade names	620	2.0
Customer relationships	66,020	17.0
	$ 79,390	16.0

The allocation of the purchase price to the assets acquired and liabilities assumed is complete with the exception of the value allocated to income tax accounts. To the extent that the Company's estimates require adjustments, the Company will modify the value.

Digital Specialty Chemicals

On March 8, 2019, the Company acquired Digital Specialty Chemicals Limited (DSC), a Toronto, Canada-based provider of advanced materials to the specialty chemical, technology, and pharmaceutical industries. DSC reports into the Specialty Chemicals and Engineered Materials segment of the Company. The acquisition was accounted for under the acquisition method of accounting and the results of operations of DSC are included in the Company's condensed consolidated financial statements as of and since March 8, 2019. Costs associated with the acquisitions of DSC were $2.1 million for the three months ended march 30, 2019 and were expensed as incurred. These costs were included in selling, general and administrative expense in the

Company’s condensed consolidated statements of operations. The acquisition does not constitute a material business combination.

The purchase price for DSC is $64.1 million, net of cash acquired. The purchase price includes (1) cash consideration of $49.9 million, or $49.4 million net of cash acquired, which was funded from the Company’s existing cash on hand, (2) a fixed deferred payment of $16.1 million that is due on March 31, 2022, recorded at $14.0 million representing the fair value of this fixed deferred payment as of the acquisition date, and (3) an earnout-based contingent consideration of $0.7 million based on the operating performance of DSC for a twelve-month period ended March 31, 2021.

The fair value of the fixed deferred payment was determined by taking the present value of this fixed deferred payment based on the term and a discount factor. The fixed deferred payment is reflected in pension benefit obligations and other liabilities in the Company’s condensed consolidated balance sheets.

Upon closing the acquisition, the Company recorded a contingent consideration obligation of $0.7 million, which represents the fair value of the earnout-based contingent consideration. This amount was estimated based on a Black Scholes model. Subsequent changes in the fair value of this obligation will be recognized as adjustments to the contingent consideration obligation and reflected within the Company’s condensed consolidated statements of operations.

On December 3, 2019 the Company entered into a settlement agreement to accelerate the fixed deferred payment of $16.1 million to no later than March 8, 2020. This payment was made in the first quarter of 2020. The Company adjusted the fair value of the fixed deferred payment from its fair value to the full value resulting in an additional $1.6 million charge to interest expense in the fourth quarter of 2019 and the liability was adjusted from other long-term liabilities to other accrued liabilities in the condensed consolidated balance sheet as of December 31, 2019. In addition to the acceleration of the fixed deferred payment, it was determined that the earnout-based contingent consideration of $0.7 million will never become owed to the sellers under the original purchase agreement. The Company removed the liability and credited selling, general and administrative expensed in the fourth quarter of 2019.

The purchase price of DSC exceeds the net of the acquisition-date amounts of the identifiable assets acquired and the liabilities assumed by $36.5 million. Cash flows used to determine the purchase price included strategic and synergistic benefits (investment value) specific to the Company, which resulted in a purchase price in excess of the fair value of identifiable net assets. This additional investment value resulted in goodwill, which is expected to be non-deductible for income tax purposes.

The following table summarizes the final allocation of the purchase price to the fair values assigned to the assets acquired and liabilities assumed at the date of the acquisition and as adjusted as of December 31, 2019:

(In thousands):		As of March 8, 2019		As of December 31, 2019
Trade accounts and note receivable, net	$	1,840	$	1,840
Inventories, net		5,523		4,307
Other current assets		1,389		1,437
Property, plant and equipment		16,791		16,654
Identifiable intangible assets		7,976		6,870
Right-of-use assets		79		79
Deferred tax asset		1,104		1,066
Other noncurrent assets		—		28
Accounts payable and accrued liabilities		(2,461)		(2,861)
Deferred tax liabilities		(2,861)		(1,802)
Long-term lease liability		(37)		(37)
Net assets acquired		29,343		27,581
Goodwill		35,133		36,540
Total purchase price, net of cash acquired	$	64,476	$	64,121

During the year ended December 31, 2019, the Company finalized its fair value determination of the assets acquired and liabilities assumed. The valuation of the assets acquired and liabilities assumed was based on the information that was available as of the acquisition date, and the expectations and assumptions that have been deemed reasonable by the Company’s management.

4. INVENTORIES

Inventories consist of the following:

(In thousands)	March 28, 2020	December 31, 2019
Raw materials	$ 102,208	$ 92,849
Work-in process	38,476	30,856
Finished goods	160,010	163,393
Total inventories, net	$ 300,694	$ 287,098

5. GOODWILL AND INTANGIBLE ASSETS

Goodwill activity for each period was as follows:

(In thousands)	Specialty Chemicals and Engineered Materials	Microcontamination Control	Advanced Materials Handling	Total
December 31, 2019	$ 397,952	$ 240,021	$ 57,071	$ 695,044
Addition due to acquisitions	31,751	—	—	31,751
Purchase accounting adjustments	1,172	1,897	—	3,069
Foreign currency translation	(2,526)	(1,104)	—	(3,630)
March 28, 2020	$ 428,349	$ 240,814	$ 57,071	$ 726,234

Identifiable intangible assets at March 28, 2020 and December 31, 2019 consist of the following:

	March 28, 2020		
(In thousands)	Gross carrying Amount	Accumulated amortization	Net carrying value
Developed technology	$ 279,158	$ 212,026	$ 67,132
Trademarks and trade names	28,942	16,753	12,189
Customer relationships	435,880	168,548	267,332
Other	36,297	27,135	9,162
	$ 780,277	$ 424,462	$ 355,815

	December 31, 2019		
(In thousands)	Gross carrying amount	Accumulated amortization	Net carrying value
Developed technology	$ 272,334	$ 204,689	$ 67,645
Trademarks and trade names	29,106	16,326	12,780
Customer relationships	405,537	161,551	243,986
Other	36,303	26,762	9,541
	$ 743,280	$ 409,328	$ 333,952

Future amortization expense during the remainder of 2020, the next four years and thereafter relating to intangible assets currently recorded in the Company’s condensed consolidated balance sheets is estimated at March 28, 2020 to be the following:

(In thousands)	Remaining 2020	2021	2022	2023	2024	Thereafter	Total
Future amortization expense	$ 36,983	47,004	46,234	45,545	31,735	148,314	$ 355,815

6. EARNINGS PER COMMON SHARE

The following table presents a reconciliation of the denominators used in the computation of basic and diluted earnings per common share (EPS):

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Basic—weighted common shares outstanding	134,745	135,299
Weighted common shares assumed upon exercise of stock options and vesting of restricted common stock	1,624	1,393
Diluted—weighted common shares and common shares equivalent outstanding	136,369	136,692

The Company excluded the following shares underlying stock-based awards from the calculations of diluted EPS because their inclusion would have been anti-dilutive for the three months ended March 28, 2020 and March 30, 2019:

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Shares excluded from calculations of diluted EPS	252	460

7. OTHER EXPENSE (INCOME), NET

Other expense (income), net for the three months ended March 28, 2020 and March 30, 2019 consists of the following:

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Loss (gain) on foreign currency remeasurement	640	(720)
Other, net	238	472
Other expense (income), net	$ 878	$ (248)

8. LEASES

As of March 28, 2020, the Company was obligated under operating lease agreements for certain sales offices and manufacturing facilities, manufacturing equipment, vehicles, information technology equipment and warehouse space. As of March 28, 2020, we do not have material finance leases. Our leases have remaining lease terms of 1 year to 14 years, some of which may include options to extend the lease for up to 6 years, and some of which may include options to terminate the leases within 1 year.

As of March 28, 2020, the Company's operating lease components with initial or remaining terms in excess of one year were classified on the condensed consolidated balance sheet and other supplemental balance sheet information was as follows:

(In thousands, except lease term and discount rate)	Classification	March 28, 2020	December 31, 2019
Assets			
Right-of-use assets	Right-of-use assets	$ 50,058	$ 50,160
Liabilities			
Short-term lease liability	Other accrued liabilities	10,172	10,025
Long-term lease liability	Long-term lease liability	43,549	43,827
Total lease liabilities		$ 53,721	$ 53,852
Lease Term and Discount Rate			
Weighted average remaining lease term (years)		8.3	8.4
Weighted average discount rate		4.9 %	4.9 %

Expense for leases less than 12 months for the three months ended March 28, 2020 and March 30, 2019 were not material. The components of lease expense for the three months ended March 28, 2020 and March 30, 2019 are as follows:

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Operating lease cost	$ 3,541	$ 3,020

The Company combines the amortization of the Right-of-use assets and the change in the operating lease liability in the same line item in the Statement of Cash Flows. Other information related to the Company's operating leases was as follows:

(In thousands)	March 28, 2020	March 30, 2019
Cash paid for amounts included in the measurement of lease liabilities:		
Operating cash flows from leases	$ 2,717	$ 2,595
Right-of-use assets obtained in exchange for lease obligations:		
Operating leases	$ 912	$ 181

Future minimum lease payments for noncancellable operating leases as of March 28, 2020, were as follows:

(In thousands)	Operating Leases
Remaining 2020	$ 12,593
2021	10,077
2022	6,834
2023	6,092
2024	5,113
Thereafter	27,281
Total	$ 67,990
Less: Interest	14,269
Present value of lease liabilities	$ 53,721

9. SEGMENT REPORTING

The Company's financial segment reporting reflects an organizational alignment intended to leverage the Company's unique portfolio of capabilities to create value for its customers by developing mission-critical solutions to maximize manufacturing yields and enable higher performance of devices. While these segments have separate products and technical know-how, they share common business systems and processes, technology centers, and strategic and technology roadmaps. The Company leverages its expertise from these three segments to create new and increasingly integrated solutions for its customers. The Company's business is reported in the following segments:

- **Specialty Chemicals and Engineered Materials (SCEM):** SCEM provides high-performance and high-purity process chemistries, gases, and materials and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes.
- **Microcontamination Control (MC):** MC solutions to filter and purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries.
- **Advanced Materials Handling (AMH):** AMH develops solutions to monitor, protect, transport, and deliver critical liquid chemistries, wafers, and substrates for a broad set of applications in the semiconductor industry and other high-technology industries.

Summarized financial information for the Company's reportable segments is shown in the following tables.

	Three months ended	
(In thousands)	March 28, 2020	March 30, 2019
Net sales		
SCEM	$ 144,214	$ 124,470
MC	159,261	157,706
AMH	116,137	116,064
Inter-segment elimination	(7,285)	(7,193)
Total net sales	$ 412,327	$ 391,047

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Segment profit		
SCEM	$ 32,670	$ 24,431
MC	50,167	47,323
AMH	20,632	22,367
Total segment profit	$ 103,469	$ 94,121

The following table reconciles total segment profit to income before income taxes:

(In thousands)	Three months ended March 28, 2020	Three months ended March 30, 2019
Total segment profit	$ 103,469	$ 94,121
Less:		
Amortization of intangible assets	16,211	18,657
Unallocated general and administrative expenses	6,514	27,973
Operating income	80,744	47,491
Interest expense	10,559	10,884
Interest income	(321)	(1,225)
Other expense (income), net	878	(248)
Income before income tax expense	$ 69,628	$ 38,080

In the following tables, revenue is disaggregated by country or region for the three months ended March 28, 2020 and March 30, 2019, respectively.

	Three months ended March 28, 2020				
(In thousands)	SCEM	MC	AMH	Inter-segment	Total
Taiwan	$ 25,182	$ 42,483	$ 24,801	$ —	$ 92,466
United States	46,550	28,680	33,403	(7,285)	101,348
South Korea	20,129	20,122	15,161	—	55,412
Japan	17,123	28,111	10,420	—	55,654
China	15,510	18,197	11,639	—	45,346
Europe	8,608	13,488	12,548	—	34,644
Southeast Asia	11,112	8,180	8,165	—	27,457
	$ 144,214	$ 159,261	$ 116,137	$ (7,285)	$ 412,327

	Three months ended March 30, 2019				
(In thousands)	SCEM	MC	AMH	Inter-segment	Total
Taiwan	$ 25,173	$ 38,490	$ 18,123	$ —	$ 81,786
United States	32,738	27,582	38,546	(7,193)	91,673
South Korea	19,326	25,815	15,978	—	61,119
Japan	11,678	25,095	11,390	—	48,163
China	14,157	22,165	9,846	—	46,168
Europe	8,777	10,775	15,599	—	35,151
Southeast Asia	12,621	7,784	6,582	—	26,987
	$ 124,470	$ 157,706	$ 116,064	$ (7,193)	$ 391,047

Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of the Company's condensed consolidated financial condition and results of operations should be read along with the condensed consolidated financial statements and the accompanying notes to the condensed consolidated financial statements included elsewhere in this Quarterly Report on Form 10-Q. The information, except for historical information, contained in this discussion and analysis or set forth elsewhere in this Quarterly Report on Form 10-Q includes forward-looking statements that involve risks and uncertainties. You should review the section entitled "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2019 as well as in our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K for a discussion of important factors that could cause actual results to differ materially from the results described in or implied by the forward-looking statements contained in the following discussion and analysis. The Company assumes no obligation to publicly release the results of any revision or updates to these forward-looking statements to reflect future events or unanticipated occurrences.

Overview

This overview is not a complete discussion of the Company's financial condition, changes in financial condition and results of operations; it is intended merely to facilitate an understanding of the most salient aspects of the Company's financial condition and operating performance and to provide a context for the detailed discussion and analysis that follows and must be read in its entirety in order to fully understand the Company's financial condition and results of operations.

The Company is a leading global developer, manufacturer and supplier of microcontamination control products, specialty chemicals and advanced materials handling solutions for manufacturing processes in the semiconductor and other high-technology industries. We leverage our unique breadth of capabilities to create value for our customers by developing mission-critical solutions to maximize manufacturing yields, reduce manufacturing costs and enable higher device performance.

Our technology portfolio includes advanced materials and high-purity chemistries, with optimized packaging and delivery systems and in-process filtration and purification solutions that ensure high-value liquid chemistries and gases are free from contaminants before use. Our standard and customized products and solutions enable the highest levels of purity and performance that are essential to the manufacture of semiconductors, flat panel displays, light emitting diodes, or LEDs, high-purity chemicals, solar cells, gas lasers, optical and magnetic storage devices, and critical components for aerospace, glass manufacturing and biomedical applications. The majority of our products are consumed at various times throughout the manufacturing process, with demand driven in part by the level of semiconductor and other manufacturing activity.

Our business is organized and operated in three operating segments, which align with the key elements of the advanced semiconductor manufacturing ecosystem. The Specialty Chemicals and Engineered Materials, or SCEM, segment provides high-performance and high-purity process chemistries, gases, and materials, and safe and efficient delivery systems to support semiconductor and other advanced manufacturing processes. The Microcontamination Control, or MC, segment offers solutions to filter and purify critical liquid chemistries and gases used in semiconductor manufacturing processes and other high-technology industries. The Advanced Materials Handling, or AMH, segment develops solutions to monitor, protect, transport, and deliver critical liquid chemistries, wafers and other substrates for a broad set of applications in the semiconductor industry and other high-technology industries. While these segments have separate products and technical know-how, they share common business systems and processes, technology centers, and strategic and technology roadmaps. We leverage our expertise from these three segments and complementary product portfolios to create new and increasingly integrated solutions for our customers. See note 9 to the condensed consolidated financial statements for additional information on the Company's three segments.

The Company's fiscal year is the calendar period ending each December 31. The Company's fiscal quarters consist of 13-week or 14-week periods that end on Saturday. The Company's fiscal quarters in 2020 end March 28, 2020, June 27, 2020, September 26, 2020 and December 31, 2020. Unaudited information for the three months ended March 28, 2020 and March 30, 2019 and the financial position as of March 28, 2020 and December 31, 2019 are included in this Quarterly Report on Form 10-Q.

Key operating factors Key factors, which management believes have the largest impact on the overall results of operations of the Company, include:

- ***Level of sales*** Since a significant portion of the Company's product costs (except for raw materials, purchased components and direct labor) are largely fixed in the short-to-medium term, an increase or decrease in sales affects gross profits and overall profitability significantly. Also, increases or decreases in sales and operating profitability affect certain costs such as incentive compensation and commissions, which are highly variable in nature. The Company's sales are subject to the effects of industry cyclicality, technological change, substantial competition, pricing pressures and foreign currency fluctuations.

- ***Variable margin on sales*** The Company's variable margin on sales is determined by selling prices and the costs of manufacturing and raw materials. This is affected by a number of factors, which include the Company's sales mix, purchase prices of raw material (especially polymers, membranes, stainless steel and purchased components), domestic and international competition, direct labor costs, and the efficiency of the Company's production operations, among others.
- ***Fixed cost structure*** The Company's operations include a number of large fixed or semi-fixed cost components, which include salaries, indirect labor and benefits, facility costs, lease expenses, and depreciation and amortization. It is not possible to vary these costs easily in the short-term as volumes fluctuate. Accordingly, increases or decreases in sales volume can have a large effect on the usage and productivity of these cost components, resulting in a large impact on the Company's profitability.

Impact of COVID-19 on our Business

A novel strain of coronavirus (COVID-19) was first identified in Wuhan, China in December 2019, and subsequently declared a pandemic by the World Health Organization.

Health and Safety

From the earliest signs of the outbreak, we have taken proactive, aggressive action to protect the health and safety of our employees, customers, partners and suppliers. We enacted rigorous safety measures in all of our sites, including implementing social distancing protocols, requiring working from home for those employees that do not need to be physically present on the manufacturing floor or in a lab to perform their work, suspending travel, implemented temperature checks at the entrances to our facilities, extensively and frequently disinfecting our workspaces and providing masks to those employees who must be physically present. We expect to continue to implement these measures until we determine that the COVID-19 pandemic is adequately contained for purposes of our business, and we may take further actions as government authorities require or recommend or as we determine to be in the best interests of our employees, customers, partners and suppliers.

Operations

As a result of the COVID-19 pandemic, governmental authorities have implemented and are continuing to implement numerous and constantly evolving measures to try to contain the virus, such as travel bans and restrictions, limits on gatherings, quarantines, shelter-in-place orders, and business shutdowns. We have important manufacturing operations in the U.S., Japan, Korea, China, Malaysia, and Taiwan, all of which have been affected by the outbreak and have taken measures to try to contain it. Measures providing for business shutdowns generally exclude certain essential services, and those essential services commonly include critical infrastructure and the businesses that support that critical infrastructure. While all of our facilities currently remain operational, these measures have impacted and may further impact our workforce and operations, as well as those of our customers, vendors and suppliers. For example, the government of Malaysia has issued an order that significantly reduces the number of employees who can be physically present to operate our Malaysian plant, which has reduced the productivity of that plant. In addition to reduced productivity, the constraints and limits imposed on our operations may slow or diminish our research and development activities and qualification activities with our customers. We also experienced brief interruptions in operations at our sites in Hangzhou, China, San Luis Obispo, California and Bedford, Massachusetts. While governmental measures may be modified or extended, we expect that our manufacturing and research and development facilities will remain operational, largely at or near full capacity. In connection with the COVID-19 pandemic, we have experienced limited absenteeism from those employees who are required to be on-site to perform their jobs, and we do not currently expect that our operations will be adversely affected by significant absenteeism.

Supply

We have not yet experienced any significant impacts or interruptions to our supply chain as a result of the COVID-19 pandemic. However, certain of our suppliers have faced difficulties maintaining operations in light of government-ordered restrictions and shelter-in-place mandates. For example, one of our critical valve suppliers was shut down and was unable to supply us with valves for our gas purification products. In this instance we were able to procure this critical part from a second, pre-qualified source. Although we regularly monitor the financial health of companies in our supply chain, financial hardship on our suppliers or sub-suppliers caused by the COVID-19 pandemic could cause a disruption in our ability to obtain raw materials or components required to manufacture our products, adversely affecting our operations. To mitigate the risk of any potential supply interruptions from the COVID-19 pandemic, we chose to increase certain inventory levels during the quarter. We may decide to take similar actions going forward. Additionally, restrictions or disruptions of transportation, such as reduced availability of air transport, port closures and increased border controls or closures, have started to result in higher costs and delays, both on obtaining raw materials and shipping finished goods to customers, which could harm our profitability, make our products less competitive, or cause our customers to seek alternative suppliers.

Demand

The outbreak has significantly increased economic and demand uncertainty. While we have seen strong demand from leading-edge customers associated with end-uses in servers, and other data center applications, we believe that a portion of recent bookings of orders may be attributable to customers increasing their inventory to reduce their exposure to risks of future supply disruptions, which could be an offset to future demand for our products. We have seen weakness in some mainstream fabs associated with the slowdown in sales of automotive, aerospace, mobile phone, and other applications. Across our three divisions, certain customers impacted by governmental reactions to COVID-19 pushed out product deliveries and acceptance inspections during the first quarter of 2020. These sales that have been delayed are expected to be recorded in our second quarter. We anticipate that the current outbreak or continued spread of COVID-19 will cause a global economic slowdown, and it is possible that it could cause a global recession. In the event of a recession, demand for our products would decline and our business would be adversely effected.

Liquidity

Although there is uncertainty related to the anticipated impact of the recent COVID-19 outbreak on our future results, we believe our business model, our current cash reserves and the recent steps we have taken to strengthen our balance sheet, such as drawing down a portion of our Revolving Facility, leave us well-positioned to manage our business through this crisis as it continues to unfold. We have reviewed numerous potential scenarios in connection with the impact of COVID-19 on the global economy and the semiconductor industry. Based on our analysis, we believe our existing balances of domestic cash and cash equivalents and our currently anticipated operating cash flows will be sufficient to meet our cash needs arising in the ordinary course of business for the next twelve months.

We continue to monitor the rapidly evolving situation and guidance from international and domestic authorities, including federal, state and local public health authorities and may take additional actions based on their recommendations. In these circumstances, there may be developments outside our control requiring us to adjust our operating plan. As such, given the dynamic nature of this situation, we cannot reasonably estimate the impacts of COVID-19 on our financial condition, results of operations or cash flows in the future. In addition, see Part II—Item 1A, “Risk Factors,” included herein for updates to our risk factors regarding risks associated with the COVID-19 pandemic.

Overall Summary of Financial Results

For the three months ended March 28, 2020, net sales increased 5% to $412.3 million, compared to $391.0 million for the three months ended March 30, 2019. Included in the quarterly sales for the three months ended March 28, 2020 were net sales primarily associated from acquired businesses of $15.4 million and unfavorable foreign currency translation effects of $0.3 million. The increase in revenue resulted from revenue attributable from acquired businesses and increased customer demand from the semiconductor market compared to the year-ago quarter.

Sales were down $14.7 million, or 3% on a sequential basis over sales of $427.0 million in the fourth quarter of 2019, including unfavorable foreign currency translation effects of $0.1 million and sales attributable to acquired businesses of $2.0 million. The decrease in revenue resulted primarily from decreased customer demand from the semiconductor market compared to the previous quarter.

Reflecting the net sales increase, the Company’s gross profit for the three months ended March 28, 2020 increased to $185.5 million, up from $177.4 million for the three months ended March 30, 2019. The Company experienced a 45.0% gross margin for the three months ended March 28, 2020, compared to 45.4% in the comparable year-ago period.

The Company’s selling, general and administrative (SG&A) expenses decreased by $23.4 million for the three months ended March 28, 2020 compared to the year-ago quarter, mainly due to a $20.6 million reduction in deal and integration costs which in the year-ago quarter included deal costs associated with the terminated Versum transaction and integration expense activity associated with other acquisitions.

As a result of the aforementioned factors, the Company reported net income of $61.0 million, or $0.45 per diluted share, for the quarter ended March 28, 2020, compared to net income of $32.7 million, or $0.24 per diluted share, a year ago.

On January 10, 2020, the Company acquired Sinmat, a chemical mechanical polishing (CMP) slurry manufacturer. Sinmat reports into the Specialty Chemicals and Engineered Material segment of the Company. The total purchase price of the acquisition was $75.6 million, net of cash acquired. The transaction is described in further detail in note 3 to the Company’s condensed consolidated financial statements.

Cash and cash equivalents were $335.1 million at March 28, 2020, compared with cash and cash equivalents of $351.9 million at December 31, 2019. The Company had outstanding debt of $1,078.9 million at March 28, 2020, compared to $936.5 million at December 31, 2019.

Critical Accounting Policies

Management’s discussion and analysis of financial condition and results of operations are based upon the Company’s condensed consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these condensed consolidated financial statements requires the Company to make estimates, assumptions and judgments that affect the reported amounts of assets, liabilities, revenues and expenses and related disclosure of contingent assets and liabilities. Actual results may differ from these estimates under different assumptions or conditions.

The critical accounting policies affected most significantly by estimates, assumptions and judgments used in the preparation of the Company's condensed consolidated financial statements are described in Item 7 of its Annual Report on Form 10-K for the year ended December 31, 2019 filed with the Securities and Exchange Commission. On an ongoing basis, the Company evaluates the critical accounting policies used to prepare its condensed consolidated financial statements, including, but not limited to, those related to impairment of long-lived assets, goodwill, income taxes and business acquisitions. There have been no material changes in these aforementioned critical accounting policies.

Three Months Ended March 28, 2020 Compared to Three Months Ended March 30, 2019 and Three Months Ended December 31, 2019

The following table compares operating results for the three months ended March 28, 2020 with results for the three months ended March 30, 2019 and three months ended December 31, 2019 both in dollars and as a percentage of net sales, for each caption.

	Three months ended					
(Dollars in thousands)	March 28, 2020		March 30, 2019		December 31, 2019	
Net sales	$ 412,327	100.0 %	$ 391,047	100.0 %	$ 426,998	100.0 %
Cost of sales	226,849	55.0	213,654	54.6	229,362	53.7
Gross profit	185,478	45.0	177,393	45.4	197,636	46.3
Selling, general and administrative expenses	58,891	14.3	82,254	21.0	67,171	15.7
Engineering, research and development expenses	29,632	7.2	28,991	7.4	30,352	7.1
Amortization of intangible assets	16,211	3.9	18,657	4.8	16,028	3.8
Operating income	80,744	19.6	47,491	12.1	84,085	19.7
Interest expense	10,559	2.6	10,884	2.8	13,375	3.1
Interest income	(321)	(0.1)	(1,225)	(0.3)	(632)	(0.1)
Other expense (income), net	878	0.2	(248)	(0.1)	248	0.1
Income before income taxes	69,628	16.9	38,080	9.7	71,094	16.6
Income tax expense	8,622	2.1	5,422	1.4	13,656	3.2
Net income	$ 61,006	14.8 %	$ 32,658	8.4 %	$ 57,438	13.5 %

Net sales For the three months ended March 28, 2020, net sales increased by 5% to $412.3 million, compared to $391.0 million for the three months ended March 30, 2019. An analysis of the factors underlying the increase in net sales is presented in the following table:

(In thousands)	
Net sales in the quarter ended March 30, 2019	$ 391,047
Increase, net associated with acquired businesses and divestitures	15,380
Increase associated with volume, pricing and mix	6,209
Decrease associated with effect of foreign currency translation	(309)
Net sales in the quarter ended March 28, 2020	$ 412,327

The Company's sales increase was primarily due to sales associated with the Company's recent acquisitions of $15.4 million, offset by unfavorable foreign currency translation effects of $0.3 million. Sales also increased from an increased customer demand from the semiconductor market compared to the year-ago quarter.

Sales percentage on a geographic basis for the three months ended March 28, 2020 and March 30, 2019 and the percentage increase (decrease) in sales for the three months ended March 28, 2020 compared to the sales for the three months ended March 30, 2019 were as follows:

	Three months ended		
	March 28, 2020	March 30, 2019	Percentage increase (decrease) in sales
Taiwan	22 %	21 %	13 %
North America	25 %	23 %	11 %
South Korea	13 %	16 %	(9)%
Japan	13 %	12 %	16 %
China	11 %	12 %	(2)%
Europe	8 %	9 %	(1)%
Southeast Asia	7 %	7 %	2 %

The increase in sales for Taiwan was primarily driven by demand for our Advanced Materials Handling products. The increase in sales for North America was primarily driven by sales from recent acquisitions. The increase in sales from Japan was primarily driven by demand for our Specialty Chemicals and Engineered Materials products. The decrease in sales from South Korea is due to decline in demand for our Microcontamination Control products.

Sales were down $14.7 million, or 3% on a sequential basis over sales of $427.0 million for the fourth quarter of 2019, including unfavorable foreign currency translation effects of $0.1 million and sales associated attributable to an acquired business of $2.0 million. The decrease in revenue resulted from decreased customer demand from the semiconductor market compared to the previous quarter.

Gross profit The Company's gross profit increased 5% for the three months ended March 28, 2020 to $185.5 million, compared to $177.4 million for the three months ended March 30, 2019. The Company experienced a 45.0% gross margin rate for the three months ended March 28, 2020, compared to 45.4% in the comparable year-ago period. The gross profit increase reflects the increase in sales, and the gross margin decrease reflects lower-than-expected volumes. The gross profit and gross margin figures include an incremental cost of sales charge of $0.4 million and $2.2 million, respectively, associated with the sale of inventory acquired in recent business acquisitions for the three months ended March 28, 2020 and March 30, 2019. Based in part on the potential impact of the COVID-19 pandemic and ensuing governmental responses on production, productivity and increased freight expenses, we anticipate that our gross margin rate will decline slightly in the second quarter of 2020.

Selling, general and administrative expenses (SG&A) expenses were $58.9 million for the three months ended March 28, 2020, down $23.4 million, or 28%, from the comparable three-month period a year earlier. An analysis of the factors underlying the decrease in SG&A is presented in the following table:

(In thousands)		
Selling, general and administrative expenses in the quarter ended March 30, 2019	$	82,254
Deal and transaction costs		(17,705)
Integration costs		(2,872)
Employee costs		(3,371)
Travel costs		(734)
Professional fees		812
Other increases, net		507
Selling, general and administrative expenses in the quarter ended March 28, 2020	$	58,891

The deal and transactions costs were $17.7 million lower in the three months ended March 28, 2020 compared to the three month ended March 30, 2019, mainly due to the deal costs associated with the terminated merger of the Versum transaction.

Engineering, research and development expenses The Company's engineering, research and development (ER&D) efforts focus on the support or extension of current product lines and the development of new products and manufacturing technologies. ER&D expenses were $29.6 million in the three months ended March 28, 2020 compared to $29.0 million in the year-ago period. An analysis of the factors underlying the increase in ER&D is presented in the following table:

(In thousands)		
Engineering, research and development expenses in the quarter ended March 30, 2019	$	28,991
Depreciation costs		653
Employee costs		(209)
Other decreases, net		197
Engineering, research and development expenses in the quarter ended March 28, 2020	$	29,632

Amortization expenses Amortization of intangible assets was $16.2 million in the three months ended March 28, 2020 compared to $18.7 million for the three months ended March 30, 2019. The decrease primarily reflects the elimination of amortization expense of $4.3 million for an identifiable backlog intangible asset acquired in the Saes Pure Gas business (SPG) acquisition that became fully amortized in the second quarter of 2019, partially offset by additional amortization expense of $2.6 million associated with recent acquisitions.

Interest income Interest income was $0.3 million in the three months ended March 28, 2020, compared to $1.2 million in the three months ended March 30, 2019. The decrease in interest income for the three months ended March 28, 2020 compared to the previous year period was due to lower average cash levels earning a lower interest rate.

Interest expense Interest expense includes interest associated with debt outstanding and the amortization of debt issuance costs associated with such borrowings. Interest expense was $10.6 million in the three months ended March 28, 2020 compared to $10.9 million in the three months ended March 30, 2019. The decrease primarily reflects lower average interest rates on the senior secured term loan facility, partially offset by higher average debt levels on the revolving facility.

Other expense (income), net Other expense, net was $0.9 million in the three months ended March 28, 2020 and consisted mainly of foreign currency transaction losses of $0.6 million. Other income, net was $0.2 million in the three months ended March 30, 2019 and consisted mainly of foreign currency transaction gains of $0.7 million, partially offset by $0.4 million charges of third-party costs associated with the amendment of the credit agreement.

Income tax expense Income tax expense was $8.6 million in the three months ended March 28, 2020, compared to income tax expense of $5.4 million in the three months ended March 30, 2019. The Company’s year-to-date effective tax rate was 12.4% in 2020, compared to 14.2% in 2019. The year-to-date income tax expense in 2020 and 2019 includes discrete benefits of $5.0 million and $2.8 million, respectively, recorded in connection with share-based compensation. The decrease in the effective tax rate from 2019 to 2020 primarily relates to decreased accrued withholding taxes due to a portion of the Company’s foreign earnings being permanently reinvested in 2020 and an increase in the federal research and development credit.

Net income Due to the factors noted above, the Company recorded net income of $61.0 million, or $0.45 per diluted share, in the three-month period ended March 28, 2020, compared to net income of $32.7 million, or $0.24 per diluted share, in the three-month period ended March 30, 2019. In the three-month period ended March 28, 2020, net income, as a percentage of net sales, increased to 14.8% from 8.4% in the year-ago period.

Non-GAAP Measures The Company’s condensed consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP). The Company also utilizes certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company’s business and results of operations. See the section “Non-GAAP Information” included below in this section for additional detail, including the definition of certain non-GAAP financial measures and the reconciliation of these non-GAAP measures to the Company’s GAAP measures.

The Company’s principal non-GAAP financial measures are Adjusted EBITDA and Adjusted Operating Income, together with related measures thereof, and non-GAAP Earnings Per Share.

Adjusted EBITDA increased 10.5% to $120.3 million in the three-month period ended March 28, 2020, compared to $108.9 million in the three-month period ended March 30, 2019. In the three month-period ended March 28, 2020, Adjusted EBITDA, as a percentage of net sales, increased to 29.2% from 27.8% in the year-ago period.

Adjusted Operating Income increased 8.1% to $99.6 million in the three-month period ended March 28, 2020, compared to $92.2 million in the three-month period ended March 30, 2019. Adjusted Operating Income, as a percentage of net sales, increased to 24.2% from 23.6% in the year-ago period.

Non-GAAP Earnings Per Share was $0.55 in the three-month period ended March 28, 2020, compared to $0.50 in the three-month period ended March 30, 2019.

Segment Analysis

The Company reports its financial performance based on three reporting segments. The following is a discussion of the results of operations of these three business segments. See note 9 to the condensed consolidated financial statements for additional information on the Company's three segments.

The following table presents selected net sales and segment profit data for the Company's three reportable segments for the three months ended March 28, 2020 and March 30, 2019.

	Three months ended	
(In thousands)	March 28, 2020	March 30, 2019
Specialty Chemicals and Engineered Materials		
Net sales	$ 144,214	$ 124,470
Segment profit	32,670	24,431
Microcontamination Control		
Net sales	$ 159,261	$ 157,706
Segment profit	50,167	47,323
Advanced Materials Handling		
Net sales	$ 116,137	$ 116,064
Segment profit	20,632	22,367

Specialty Chemicals and Engineered Materials (SCEM)

For the first quarter of 2020, SCEM net sales increased to $144.2 million, compared to $124.5 million in the comparable period last year. The sales increase was due to increased sales of advanced deposition materials, cleaning chemistries, and additional sales of $12.4 million attributable to the acquisitions of DSC in the first quarter of 2019, MPD in the third quarter of 2019 and Sinmat in the first quarter of 2020. SCEM reported a segment profit of $32.7 million in the first quarter of 2020, up 34% from $24.4 million in the year-ago period. The segment profit increase was primarily due to higher gross profit related to the increased sales, partially offset by a 5% increase in operating expenses, primarily due to recent acquisitions.

Microcontamination Control (MC)

For the first quarter of 2020, MC net sales increased to $159.3 million, compared to $157.7 million in the comparable period last year. The sales increase was mainly due to improved sales from liquid filtration and gas filtration products and additional sales of $3.0 million attributable to the acquisition of Anow in the third quarter of 2019, partially offset by weakened sales from gas purification products. MC reported a segment profit of $50.2 million in the first quarter of 2020, up 6% from $47.3 million in the year-ago period. The segment profit improvement was primarily due to higher gross profit related to the increased sales and a decrease in operating expenses of 1%.

Advanced Materials Handling (AMH)

For the first quarter of 2020, AMH net sales were flat at $116.1 million, compared to $116.1 million in the comparable period last year. AMH reported a segment profit of $20.6 million in the first quarter of 2020, down 8% from $22.4 million in the year-ago period. The segment profit decrease was primarily due to lower gross profit related to product mix and volume, partially offset by a 9% decrease in operating expenses, primarily due to lower spending and restructuring initiatives from the previous year.

Unallocated general and administrative expenses

Unallocated general and administrative expenses totaled $6.5 million in the first quarter of 2020, compared to $28.0 million in the comparable period last year. The $21.5 million decrease mainly reflects a $20.6 million decrease in deal and transaction costs and integration costs referenced in the discussion of SG&A above.

Liquidity and Capital Resources

We consider the following when assessing our liquidity and capital resources:

In thousands	**March 28, 2020**	**December 31, 2019**
Cash and cash equivalents	$ 335,077	$ 351,911
Working capital	764,316	667,964
Total debt	1,078,888	936,484

The Company has historically financed its operations and capital requirements through cash flow from its operating activities, long-term loans, lease financing and borrowings under domestic and international short-term lines of credit. Although there is uncertainty related to the anticipated impact of the recent COVID-19 outbreak on the Company's future results, we believe our business model, our current cash reserves and the recent steps we have taken to strengthen our balance sheet, such as drawing down a significant portion of our Revolving Facility, will help us to manage our business through this crisis as it continues to unfold. We have reviewed numerous potential scenarios in connection with the impact of COVID-19 on the global economy and the semiconductor industry. Based on our analysis, we believe our existing balances of domestic cash and cash equivalents and our currently anticipated operating cash flows will be sufficient to meet our cash needs arising in the ordinary course of business for the next twelve months. As the opportunity arises, we may seek to take advantage of opportunities to raise additional capital through additional debt financing or through public or private sales of securities. If in the future our available liquidity is not sufficient to meet the Company's operating and debt service obligations as they come due, management would need to pursue alternative arrangements through additional equity or debt financing in order to meet the Company's cash requirements. There can be no assurance that any such financing would be available on commercially acceptable terms, or at all. To date, in fiscal 2020, we have not experienced difficulty accessing the capital and credit markets; however, future volatility in the capital and credit markets may increase costs associated with issuing debt instruments or affect our ability to access those markets. In addition, it is possible that our ability to access the capital and credit markets could be limited at a time when we would like, or need, to do so, which could have an adverse impact on our ability to refinance maturing debt and/or react to changing economic and business conditions.

In summary, our cash flows for each period were as follows:

	Three months ended	
(in thousands)	**March 28, 2020**	**March 30, 2019**
Net cash provided by (used in) operating activities	$ 11,403	$ (2,538)
Net cash used in investing activities	(98,210)	(84,057)
Net cash provided by (used in) financing activities	71,685	(52,851)
Decrease in cash and cash equivalents	$ (16,834)	$ (139,702)

Operating activities

Cash provided by operating activities is net income adjusted for certain non-cash items and changes in assets and liabilities. Cash flows provided by operating activities totaled $11.4 million in the three months ended March 28, 2020 compared to cash flows used in operating activities of $2.5 million in the three months ended March 30, 2019. The increase in cash provided by operating activities was primarily due to higher net income and changes in working capital and other assets and liabilities. The net change in working capital and other assets and liabilities resulted in a decrease to cash provided by (used in) operations of $97.0 million for the three months ended March 28, 2020 compared to a decrease of $80.9 million for the three months ended March 30, 2019.

Changes in working capital and other assets and liabilities for three months ended March 28, 2020 were driven by increases in accounts receivable and inventories, partially offset by a decrease in income taxes payable. The change for accounts receivable was primarily due to the Company's quarter closing date occurring several days prior to the end of the calendar month, the period during which receivable collections are typically heavy, particularly for the Company's Asia operations as compared to the three months ended March 30, 2019. The change for inventory is due to an increase in raw material purchases to provide a buffer related to any potential supply chain issues related to COVID-19. The change related to incomes taxes reflects lower income tax payments in the three-month period ended March 28, 2020 compared to the three-month period March 30, 2019.

Investing activities Cash flows used in investing activities totaled $98.2 million in the three-month period ended March 28, 2020 compared to cash flows used in investing activities of $84.1 million in the three-month period ended March 30, 2019. The change was due to lower cash paid for acquisitions and acquisition of property, plant and equipment.

Acquisition of property, plant and equipment totaled $22.6 million in the three-month period ended March 28, 2020, which primarily reflected investments in equipment and tooling compared to $34.5 million in the three-month period ended March 30, 2019, which primarily reflected investment in equipment and tooling.

On January 10, 2020, the Company acquired Sinmat, a CMP slurry manufacturer. Sinmat reports into the Specialty Chemicals and Engineered Material segment of the Company. The cash used to acquire Sinmat for the three-month period ended March 28, 2020 was $75.6 million, net of cash acquired. The transaction is described in further detail in note 3 to the Company's condensed consolidated financial statements.

In the three-month period ended March 30, 2019, the Company acquired Digital Specialty Chemicals Limited (DSC), which provides advanced materials to the specialty chemical, technology and pharmaceutical industries. The cash used to acquire DSC for the three-month period ended March 30, 2019 was $49.8 million, net of cash acquired. The transaction is described in further detail in note 3 to the Company's condensed consolidated financial statements.

As of March 28, 2020, the Company expects its full-year capital expenditures in 2020 to be approximately $120.0 million. As of March 28, 2020, the Company had outstanding capital purchase obligations of $32.3 million for the construction or purchase of plant and equipment not yet recorded in the Company's condensed consolidated financial statements as the Company had not yet received the related goods or property.

Financing activities Cash flows provided by financing activities totaled $71.7 million during the three-month period ended March 28, 2020 compared to cash flows used in financing activities of $52.9 million during the three-month period ended March 30, 2019. The change was primarily due to net long-term debt activity, which was a source of cash of $142.0 million in the three-month period ended March 28, 2020 compared to a use of cash of $1.0 million in the comparable period in 2019 and a $5.8 million decrease of repurchases of common stock, partially offset by a $16.1 million deferred acquisition payment in the three-month period ended March 28, 2020 related to our DSC acquisition. In March 2020, the Company suspended its share repurchase program.

Our total dividend payments were $10.9 million in the three-month period ended March 28, 2020 compared to $9.5 million in three-month period ended March 30, 2019. We have paid a cash dividend in each of the past 10 quarters. On April 15, 2020, the Board declared a quarterly cash dividend of $0.08 per share of common stock, payable on May 20, 2020 to stockholders of record on April 29, 2020.

Other Liquidity and Capital Resources Considerations

The Company's Term Loan Facility has a principal amount of $396 million outstanding that matures on November 6, 2025 and bears interest rate at a 3.61% at March 28, 2020.

The Company's Revolving Facility has a senior secured revolving commitment facility in an aggregate amount of $300 million maturing November 6, 2023. The Revolving Facility bears interest at a rate per annum equal to, at the Company's option, either a base rate (such as prime rate) or LIBOR plus, in each case, an applicable margin. At March 28, 2020, $142.0 million is outstanding under the Revolving Facility and we had undrawn outstanding letters of credit of $0.2 million.

We have $550 million aggregate principal amount of 4.625% senior unsecured notes due February 10, 2026 outstanding.

Through March 28, 2020, the Company was in compliance with all applicable financial covenants included in the terms of its credit facilities.

The Company also has lines of credit with two banks that provide for borrowings of Japanese yen for the Company's Japanese subsidiary, equivalent to an aggregate of approximately $11.1 million. There were no outstanding borrowings under these lines of credit at March 28, 2020.

As of March 28, 2020, the Company's sources of available funds were its cash and cash equivalents of $335.1 million, funds available under the Revolving Facility and international credit facilities and cash flow generated from operations. As of March 28, 2020, the amount of cash and cash equivalents held in certain of our foreign operations totaled approximately $201.5 million. If we repatriate such funds, we will be required to pay income taxes in certain U.S. states and applicable foreign withholding taxes on those amounts during the period when such repatriation occurs. We have accrued taxes for the tax effect of repatriating the funds to the U.S. After March 28, 2020, to further increase domestic liquidity the Company repatriated approximately $38.0 million in cash from foreign jurisdictions back to the U.S.

Off-Balance Sheet Arrangements

As of March 28, 2020, we did not have any off-balance sheet arrangements that have, or are reasonably likely to have, a material current or future effect on our financial condition, results of operations, liquidity, capital expenditures or capital resources.

Contractual Obligations

There have been no significant changes to the contractual obligations reported in our Annual Report on Form 10-K for the fiscal year ended December 31, 2019, except for long-term debt. Long-term debt increased an additional $142 million during the quarter for borrowings on our Revolving Facility due 2023.

Recently adopted accounting pronouncements Refer to note 1 to the Company's condensed consolidated financial statements for a discussion of accounting pronouncements recently adopted.

Recently issued accounting pronouncements Refer to note 1 to the Company's condensed consolidated financial statements for a discussion of accounting pronouncements recently issued but not yet adopted.

Non-GAAP Information The Company's condensed consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States (GAAP).

The Company also provides certain non-GAAP financial measures as a complement to financial measures provided in accordance with GAAP in order to better assess and reflect trends affecting the Company's business and results of operations. These non-GAAP financial measures include Adjusted EBITDA and Adjusted Operating Income together with related measures thereof, and non-GAAP Earnings Per Share (EPS), as well as certain other supplemental non-GAAP financial measures included in the discussion of the Company's financial results.

Adjusted EBITDA, a non-GAAP financial measure, is defined by the Company as net income before (1) income tax expense, (2) interest expense, (3) interest income, (4) other expense (income), net, (5) charge for fair value write-up of acquired inventory sold, (6) deal and transaction costs, (7) integration costs, (8) severance and restructuring costs, (9) amortization of intangible assets and (10) depreciation. Adjusted Operating Income, another non-GAAP financial measure, is defined by the Company as Adjusted EBITDA exclusive of the depreciation addback noted above. The Company also utilizes non-GAAP financial measures whereby Adjusted EBITDA and Adjusted Operating Income are each divided by the Company's net sales to derive Adjusted EBITDA Margin and Adjusted Operating Margin, respectively.

Non-GAAP EPS, a non-GAAP financial measure, is defined by the Company as net income before (1) charge for fair value write-up of acquired inventory sold, (2) deal and transaction costs, (3) integration costs, (4) severance and restructuring costs, (5) amortization of intangible assets and (6) the tax effect of those adjustments to net income, stated on a per share basis.

The Company provides supplemental non-GAAP financial measures to better understand its business and believes these measures provide investors and analysts additional and meaningful information for the assessment of the Company's ongoing results. Management also uses these non-GAAP measures to assist in the evaluation of the performance of its business segments and to make operating decisions.

Management believes the Company's non-GAAP measures help indicate the Company's baseline performance before certain gains, losses or other charges that may not be indicative of the Company's business or future outlook and offer a useful view of business performance in that the measures provide a more consistent means of comparing performance. The Company believes the non-GAAP measures aid investors' overall understanding of the Company's results by providing a higher degree of transparency for such items and providing a level of disclosure that will help investors understand how management plans, measures and evaluates the Company's business performance. Management believes that the inclusion of non-GAAP measures provides greater consistency in its financial reporting and facilitates investors' understanding of the Company's historical operating trends by providing an additional basis for comparisons to prior periods.

Management uses Adjusted EBITDA and Adjusted Operating Income to assist it in evaluations of the Company's operating performance by excluding items that management does not consider as relevant in the results of its ongoing operations. Internally, these non-GAAP measures are used by management for planning and forecasting purposes, including the preparation of internal budgets; for allocating resources to enhance financial performance; for evaluating the effectiveness of operational strategies; and for evaluating the Company's capacity to fund capital expenditures, secure financing and expand its business.

In addition, and as a consequence of the importance of these non-GAAP financial measures in managing its business, the Company's Board of Directors uses non-GAAP financial measures in the evaluation process to determine management compensation.

The Company believes that certain analysts and investors use Adjusted EBITDA, Adjusted Operating Income and non-GAAP EPS as supplemental measures to evaluate the overall operating performance of firms in the Company's industry. Additionally, lenders or potential lenders use Adjusted EBITDA measures to evaluate the Company's creditworthiness.

The presentation of non-GAAP financial measures is not meant to be considered in isolation, as a substitute for, or superior to, financial measures or information provided in accordance with GAAP. Management strongly encourages investors to review the Company's condensed consolidated financial statements in their entirety and to not rely on any single financial measure.

Management notes that the use of non-GAAP measures has limitations:

First, non-GAAP financial measures are not standardized. Accordingly, the methodology used to produce the Company's non-GAAP financial measures is not computed under GAAP and may differ notably from the methodology used by other companies. For example, the Company's non-GAAP measure of Adjusted EBITDA may not be directly comparable to EBITDA or an adjusted EBITDA measure reported by other companies.

Second, the Company's non-GAAP financial measures exclude items such as amortization and depreciation that are recurring. Amortization of intangibles and depreciation have been, and will continue to be for the foreseeable future, a significant recurring expense with an impact upon the Company's results of operations, notwithstanding the lack of immediate impact upon cash flows.

Third, there is no assurance the Company will not have future charges for fair value write-up of acquired inventory, restructuring activities, deal costs, integration costs, or similar items and, therefore, may need to record additional charges (or credits) associated with such items, including the tax effects thereon. The exclusion of these items in the Company's non-GAAP measures should not be construed as an implication that these costs are unusual, infrequent or non-recurring.

Management considers these limitations by providing specific information regarding the GAAP amounts excluded from these non-GAAP financial measures and evaluating these non-GAAP financial measures together with their most directly comparable financial measures calculated in accordance with GAAP. The calculations of Adjusted EBITDA, Adjusted Operating Income, and non-GAAP EPS, and reconciliations between these financial measures and their most directly comparable GAAP equivalents, are presented below in the accompanying tables.

Reconciliation of GAAP Net Income to Adjusted Operating Income and Adjusted EBITDA

	Three months ended	
(In thousands)	March 28, 2020	March 30, 2019
Net sales	$ 412,327	$ 391,047
Net income	$ 61,006	$ 32,658
Adjustments to net income		
Income tax expense	8,622	5,422
Interest expense	10,559	10,884
Interest income	(321)	(1,225)
Other expense (income), net	878	(248)
GAAP – Operating income	80,744	47,491
Charge for fair value write-up of acquired inventory sold	361	2,155
Deal and transaction costs	1,431	19,136
Integration costs	48	2,920
Severance and restructuring costs	843	1,821
Amortization of intangible assets	16,211	18,657
Adjusted operating income	99,638	92,180
Depreciation	20,648	16,721
Adjusted EBITDA	$ 120,286	$ 108,901
Net income - as a % of net sales	14.8 %	8.4 %
Adjusted operating income – as a % of net sales	24.2 %	23.6 %
Adjusted EBITDA – as a % of net sales	29.2 %	27.8 %

Reconciliation of GAAP Net Income and Earnings per Share to Non-GAAP Net Income and Earnings per Share

	Three months ended	
(In thousands, except per share data)	March 28, 2020	March 30, 2019
Net income	$ 61,006	$ 32,658
Adjustments to net income		
Charge for fair value write-up of acquired inventory sold	361	2,155
Deal and transaction costs	1,431	19,547
Integration costs	48	2,920
Severance and restructuring costs	843	1,821
Amortization of intangible assets	16,211	18,657
Tax effect of adjustments to net income and certain discrete tax items[1]	(4,329)	(9,864)
Non-GAAP net income	$ 75,571	$ 67,894
Diluted earnings per common share	$ 0.45	$ 0.24
Effect of adjustments to net income	0.11	0.26
Diluted non-GAAP earnings per common share	$ 0.55	$ 0.50

[1]The tax effect of pre-tax adjustments to net income was calculated using the applicable marginal tax rate for each respective year.

Item 3. Quantitative and Qualitative Disclosures About Market Risk

The Company's principal financial market risks are sensitivities to interest rates and foreign currency exchange rates. The Company's interest-bearing cash equivalents and senior secured financing obligations are subject to interest rate fluctuations. The Company's cash equivalents are instruments with maturities of three months or less. A 100 basis point change in interest rates would potentially increase or decrease annual net income by approximately $1.5 million annually.

The cash flows and results of operations of the Company's foreign-based operations are subject to fluctuations in foreign exchange rates. We have sales denominated in the South Korean Won, New Taiwan Dollar, Chinese Renmibi, Canadian Dollar, Malaysian Ringgit, Singapore Dollar, Euro, Israeli Shekel and the Japanese Yen. Approximately 22.8% of the Company's sales are denominated in these currencies. Financial results therefore will be affected by changes in currency exchange rates. If all foreign currencies were to see a 10% reduction versus the U.S. dollar during the three months ended March 28, 2020 revenue would be negatively impacted by approximately $9.4 million.

The Company occasionally uses derivative financial instruments to manage the foreign currency exchange rate risks associated with its foreign-based operations. At March 28, 2020, the Company had no net exposure to any foreign currency forward contracts.

Item 4. Controls and Procedures

(a) Evaluation of disclosure controls and procedures.
The Company's management, including the Chief Executive Officer (CEO) and Chief Financial Officer (CFO), has conducted an evaluation of the effectiveness of the Company's disclosure controls and procedures (as defined under Rules 13a-15(e) and 15d-15(e) promulgated under the Securities Exchange Act of 1934 (the 1934 Act)) as of March 28, 2020. The term "disclosure controls and procedures" means controls and other procedures of a company that are designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the 1934 Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the 1934 Act is accumulated and communicated to the company's management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on management's evaluation (with the participation of the Company's CEO and CFO), as of March 28, 2020, the Company's CEO and CFO have concluded that the disclosure controls and procedures used by the Company were effective to provide reasonable assurance that information required to be disclosed by the Company in reports that it files or submits under the 1934 Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms, and is accumulated and communicated to management, including its principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

(b) Changes in internal control over financial reporting.
There has been no change in the Company's internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the 1934 Act) identified in connection with the foregoing evaluation of disclosure controls and procedures that occurred during the most recently completed fiscal quarter that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

The Company acquired MPD Chemicals (MPD), Hangzhou Anow Microfiltration Co., Ltd. (Anow) and Sinmat on July 15, 2019, September 17, 2019 and January 10, 2020, respectively. None of MPD, Anow and Sinmat is significant to the Company's financial statements. The Company is continuing to integrate MPD, Anow and Sinmat into the Company's internal control over financial reporting, and the foregoing evaluation of the effectiveness of the Company's disclosure controls and procedures does not include an assessment of those disclosure controls and procedures of MPD, Anow and Sinmat that are subsumed by internal control over financial reporting.

PART II

OTHER INFORMATION

Item 1. Legal Proceedings

As of March 28, 2020, the Company is subject to various claims, legal actions, and complaints arising in the ordinary course of business. The Company believes the final outcome of these matters will not have a material adverse effect on its condensed consolidated financial statements. The Company expenses legal costs as incurred.

Item 1A. Risk Factors

This section augments and updates certain risk factors disclosed in Item 1A of Part I of our Annual Report on Form 10-K for the year ended December 31, 2019 (the “Annual Report”). The following risk factors supersede the corresponding risks described in the Annual Report and should be read together with the other risk factors disclosed in the Annual Report. In addition to the other information in this Quarterly Report on Form 10-Q, all of these risk factors should be carefully considered in evaluating us and our common stock. Any of these risks, many of which are beyond our control, could materially and adversely affect our financial condition, results of operations or cash flows, or cause our actual results to differ materially from those projected in any forward-looking statements. We may also face other risks and uncertainties that are not presently known, are not currently believed to be material, or are not identified below because they are common to all businesses. Past financial performance may not be a reliable indicator of future performance, and historical trends should not be used to anticipate results or trends in future periods. For more information, see “Cautionary Statements” at the beginning of this Quarterly Report on Form 10-Q.

Risks Related to Our Business and Industry

The COVID-19 pandemic and ensuing governmental responses could materially adversely affect our financial condition and results of operations.

As a result of the COVID-19 pandemic, governmental authorities have implemented and are continuing to implement numerous and constantly evolving measures to try to contain the virus, such as travel bans and restrictions, limits on gatherings, quarantines, shelter-in-place orders, and business shutdowns. We have important manufacturing operations in the U.S., Japan, Korea, China, Malaysia, and Taiwan, all of which have been affected by the outbreak and have taken measures to try to contain it. Measures providing for business shutdowns generally exclude certain essential services, and those essential services commonly include critical infrastructure and the businesses that support that critical infrastructure. While all of our facilities currently remain operational, these measures have impacted and may further impact our workforce and operations, as well as those of our customers, vendors and suppliers. For example, the government of Malaysia has issued an order that significantly reduces the number of employees who can be physically present to operate our Malaysian plant, which has reduced the productivity of that plant. In addition to reduced productivity, the constraints and limits imposed on our operations may slow or diminish our research and development activities and qualification activities with our customers. Although many governmental measures have had specific expiration dates, some of those measures have already been extended more than once; as a result, there is considerable uncertainty regarding the duration of such measures and potential future measures. Restrictions on our manufacturing, support operations or workforce, or similar limitations for our vendors and suppliers, could limit our ability to meet customer demand and could have a material adverse effect on our financial condition and results of operations. Furthermore, restrictions or disruptions of transportation, such as reduced availability of air transport, port closures and increased border controls or closures, have started to result in higher costs and delays, which could harm our profitability, make our products less competitive, or cause our customers to seek alternative suppliers.

The outbreak has significantly increased economic and demand uncertainty. We anticipate that the current outbreak or continued spread of COVID-19 will cause an economic slowdown, and it is possible that it could cause a global recession.

In response to these developments, we have modified our business practices, including restricting employee travel, modifying employee work locations, implementing social distancing and enhanced sanitary measures in our facilities, and cancelling attendance at events and conferences. Many of our suppliers, vendors and service providers have made similar modifications. The resources available to employees working remotely may not enable them to maintain the same level of productivity and efficiency, and these and other employees may face additional demands on their time, such as increased responsibilities resulting from school closures or the illness of family members. While we have experienced only limited absenteeism from those employees who are required to be on-site to perform their jobs, absenteeism may increase in the future and may harm our productivity. Further, our increased reliance on remote access to our information systems increases our exposure to potential cybersecurity breaches. We may take further actions as government authorities require or recommend or as we determine to be in the best interests of our employees, customers, partners and suppliers. There is no certainty that such measures will be sufficient to mitigate the risks posed by the virus, in which case our employees may become sick, our ability to perform critical functions could be harmed, and we may be unable to respond to the needs of our global business. The resumption of normal business operations after such interruptions may be delayed or constrained by lingering effects of COVID-19 on our suppliers, third-party service providers, and/or customers.

The degree to which COVID-19 impacts our results will depend on future developments, which are highly uncertain and cannot be predicted, including, but not limited to, the duration and spread of the outbreak, its severity, the actions to contain the virus and address its impact, and how quickly and to what extent normal economic and operating conditions can resume. Furthermore, the COVID-19 pandemic makes it more difficult for us to forecast demand and provide guidance for the remainder of 2020. Accordingly, any guidance we provide is likely to be less reliable than usual, and actual results are more likely to differ from any such guidance. In light of the foregoing, investors are urged to put the guidance in context and not to place undue reliance on it.

Anticipated declines in the semiconductor industry and worldwide economic conditions, at least in the short term, are likely to cause demand for our products to decrease and to adversely affect our business.

We anticipate declines in industry and worldwide economic conditions at least in the short term, and these declines are likely to adversely affect our business for a period of time. We expect that the COVID-19 pandemic will cause an economic slowdown, and it is possible that it could cause a global recession or other adverse economic conditions across the world. In the event of a recession or other downturn in the worldwide economy, demand for our products would decline and our business would be adversely effected. Our revenue is primarily dependent upon demand from semiconductor manufacturers, which is largely driven by the current and anticipated demand for electronic products that utilize semiconductors. Despite recent increases in demand for semiconductors in applications such as smartphones, cloud computing, the Internet of Things, and artificial intelligence, the semiconductor industry has historically been, and is likely to continue to be, highly cyclical with periodic significant downturns, resulting in significantly decreased demand for products such as ours. We have previously experienced significant revenue deterioration and operating losses due to severe downturns in the semiconductor industry, which often occur suddenly. The semiconductor industry is also affected by seasonal shifts in demand. Although we currently anticipate an economic downturn in the near term as a result of the COVID-19 pandemic, we are unable to predict its duration or severity, nor are we able to predict the timing, duration or severity of any future downturns in the semiconductor industry. As a result, we could underperform the market or our peers.

During downturns and periods of soft demand, our revenue is reduced, and we typically experience greater pricing pressure and shifts in product and customer mix, which often adversely affect our gross margin and net income. Even moderate seasonality can cause our operating results to fluctuate significantly from one period to the next. Uncertain and volatile economic, political, public health or business conditions in any of our key sales regions can cause or exacerbate negative trends in business and consumer spending and have historically impacted customer demand for our products. These conditions can cause material adverse changes in our results of operations and financial condition, including:

- a decline in demand for our products, which, given our limited backlog, will have an immediate impact on our revenues;
- an increase in reserves for accounts receivable due to our customers’ inability to pay us;
- lower utilization of our manufacturing facilities, which could lead to lower margins;
- an increase in write-offs for excess or obsolete inventory that we cannot sell;
- potential impairment charges relating to goodwill, intangible assets, manufacturing equipment or other long-lived assets, to the extent that any downturn indicates that the carrying amount of the asset may not be recoverable;
- greater challenges in forecasting operating results, making business decisions, and identifying and prioritizing business risks; and
- additional cost reduction efforts, including additional restructuring activities, which may adversely affect our ability to capitalize on opportunities.

We anticipate that the COVID-19 pandemic will likely cause us to experience at least some of these adverse changes, but we cannot predict the degree to which they will occur. They may be more severe than we currently expect; for example, recent bookings of orders may be attributable to customers increasing their inventory to reduce their exposure to risks of future supply disruptions, which could be an offset to future demand for our products. Furthermore, to remain competitive, we must maintain a satisfactory level of engineering, research and development, invest in our infrastructure and maintain the ability to respond to any increases in demand and, as a result, a lower volume of sales can have a large and disproportionate impact on our profitability.

Our revenues and operating results are variable.

Our revenues and operating results may fluctuate significantly from quarter to quarter or year to year due to a number of factors, many of which are outside our control. We manage our expenses based in part on our expectations of future revenues. Because some of our expenses are relatively fixed in the short term, a change in the timing of revenue or the amount of profit we generate from a small number of transactions can unfavorably affect operating results in a particular period. Factors that may cause our financial results to fluctuate unpredictably include:

- economic conditions in the semiconductor industry or in the other industries we serve;
- the impact of the COVID-19 pandemic on the global economy, the semiconductor industry, our manufacturing capabilities or our supply chain;
- the size and timing of customer orders;
- consolidation of our customers could impact their purchasing decisions and negatively affect our revenues;
- procurement shortages;
- the failure of our suppliers or outsource providers to perform their obligations;
- manufacturing difficulties;
- additional expenses we would expect to incur in our efforts to respond promptly to any supply shortages, manufacturing difficulties or other vendor problems;
- decisions to increase or accelerate our purchasing of raw materials, components or other supplies in an effort to mitigate supply risk;
- customer cancellations of or delays in shipments, installations or customer acceptances or, alternatively, acceleration of orders from customers to increase their inventory;
- our customers' rate of replacement of our consumable products;
- changes in average selling prices, customer mix, and product mix;
- our ability to develop, introduce, and market new, enhanced, and competitive products in a timely manner;
- our competitors' introduction of new products;
- legal or technical challenges to our products or technologies;
- disruptions in transportation, communication, demand, information technology, or supply, including strikes, acts of God, wars, terrorist activities, and natural or man-made disasters;
- legal, tax, accounting, or regulatory changes (including changes in import/export regulations and tariffs) or changes in the interpretation or enforcement of existing requirements;
- changes in our estimated tax rate; and
- foreign currency exchange rate fluctuations.

The COVID-19 pandemic is likely to exacerbate the adverse impact of many of these factors on our revenues and results of operations, at least in the short term.

We depend on single and limited source suppliers and an interruption in our ordinary sources of supply could affect our ability to manufacture our products and have an adverse effect on our results of operations.

We rely on single or limited source suppliers for raw materials, such as plastic polymers, filtration membranes, petroleum coke and other materials, which are critical to the manufacturing of our products. If we were to lose any one of these sources, it could be difficult for us to find an alternative supplier and we would need to qualify this new source through our customers' rigorous qualification processes. Although we seek to reduce our dependence on sole and limited source suppliers, the partial or complete loss of any of these sources could interrupt our manufacturing operations and result in a material adverse effect on our results of operations. At times, we have experienced a limited supply of certain raw materials, which has resulted in delays, lost revenue, increased costs and risks associated with qualifying products made from such new raw materials with our customers. Events such as an industry-wide increase in demand for, or the discontinuation of, raw materials used in our products could harm our ability to acquire sufficient quantities and our manufacturing operations may be interrupted. For example, in 2019, we experienced a disruption in the supply of certain ceramic material for use in our coatings business in our SCEM division when the supplier was unable to produce these materials at the required specifications. In response, we worked collaboratively with the supplier to determine the root cause and to solve the manufacturing issue, reestablishing the supply of these materials. Although we were able to reestablish our supply of this raw material, we may be unable to do so in the future or with other raw materials, in which case raw materials shortages may adversely affect our operations. Additionally, our suppliers may not have the capacity to meet increases in our demand for raw materials, in turn, making it difficult for us to meet demand from our customers. Furthermore, prices for our raw materials can vary widely. While we have long-term arrangements with certain key suppliers that fix our price for the purchase of certain raw materials, if the cost of our raw materials increases and we are unable to correspondingly increase the sales price of our products or find other cost savings, our profit margins will decline.

Although we have not yet experienced any significant impacts or interruptions to our supply chain as a result of the COVID-19 pandemic, there is no assurance that they will not occur in the future. Certain of our suppliers have faced difficulties maintaining operations in light of government-ordered restrictions and shelter-in-place mandates. If our suppliers or sub-suppliers are unable to maintain their operations or restrictions become more severe, we may encounter difficulties obtaining raw materials, which may cause us to fail to meet customer demand or require us to pay higher prices for these materials, either of which could harm our business and profitability. For example, one of our critical valve suppliers was shut down and was unable to supply us with valves for our gas purification products. Although in this instance we were able to procure this critical part from a second, pre-qualified source, we may be unable to find alternative sources of supply in the future and may therefore be adversely affected by supply interruptions resulting from the COVID-19 pandemic. Additionally, an economic slowdown caused by the COVID-19 pandemic could harm the financial health of our suppliers and sub-suppliers. Although we regularly monitor the financial health of companies in our supply chain, financial hardship on our suppliers or sub-suppliers could cause a disruption in our ability to obtain raw materials or components required to manufacture our products, adversely affecting our operations or require us to alter our payment terms with certain suppliers, including prepaying for raw materials, which could put downward pressure on our cash flow.

We are exposed to the risks of operating a global business as a significant amount of our sales and manufacturing activity occur outside the United States.

Sales to customers outside the United States accounted for approximately 75%, 76%, 78% and 79% of our net sales in the three months ended March 28, 2020 and in 2019, 2018 and 2017, respectively. We anticipate that international sales will continue to account for a majority of our net sales. In addition, a number of our key domestic customers derive a significant portion of their revenues from sales in international markets. We also manufacture a significant portion of our products outside the United States and are dependent on international suppliers for many of our parts and raw materials. We intend to continue to pursue opportunities in both sales and manufacturing internationally. Our international operations are subject to a number of risks and potential costs that could adversely affect our revenue and profitability, including:

- border closures, travel bans, entry limitations or inspections, and other restrictions on the international movement of goods, including actions to limit the export of goods in order to secure a domestic supply in light of actual or anticipated global shortages, as well as the potential exercise of governmental power to requisition or prioritize the production of specified goods or to commandeer facilities in the public interest, such as in the effort to combat the COVID-19 pandemic, any of which could adversely affect our ability to obtain supplies and delivery our products to customers;
- government actions, laws, rules, regulations and policies, such as “trade wars,” tariffs, sanctions or other changes in international trade requirements that affect our business and that of our customers and suppliers, any of which could impose additional costs on our operations and limit our ability to operate our business;
- challenges in hiring and integrating workers in different countries;
- challenges in managing a diverse workforce with different experience levels, languages, cultures, customs, business practices and worker expectations, along with differing employment practices and labor issues;
- challenges of maintaining appropriate business processes, procedures and internal controls and complying with legal, environmental, health and safety, anti-bribery, anti-corruption and other regulatory requirements that vary by jurisdiction, including new and evolving requirements for social distancing and other measures to minimize the spread of COVID-19;
- challenges in developing relationships with local customers, suppliers and governments;
- fluctuating pricing and availability of raw materials and supply chain interruptions or slowdowns, including as a result of difficulties, financial or otherwise, faced by segments of the transportation industry;
- public health crises, such as the COVID-19 pandemic;
- expense and complexity of complying with U.S. and foreign import and export regulations, including the ability to obtain required import and export licenses;
- fluctuations in interest rates and currency exchange rates, including the relative strength or weakness of the U.S. dollar against foreign currencies that are important to our business, including Japanese yen, euro, Taiwanese dollar, Korean won, Chinese yuan, Singapore dollar or Malaysian ringgit, which could cause our sales and profitability to decline;
- liability for foreign taxes assessed at rates higher than those applicable to our domestic operations;

- customer or government efforts to encourage operations and sourcing in a particular country, such as Korea and China, including efforts to develop and grow local competitors, requiring local manufacturing, and providing special incentives to government-backed local customers to buy from local competitors, even if their products are inferior to ours; and
- political and economic instability and uncertainty, which may result in severely diminished liquidity and credit availability, rating downgrades of sovereign debt, declining valuation of certain investments, declines in consumer confidence, declines in economic growth, and increased volatility in unemployment rates.

In the past, these factors have disrupted our operations and increased our costs, and we expect that these factors will continue to do so in the future.

Risks Related to Owning our Common Stock

The price of our common stock has been volatile in the past and may be volatile in the future.

The price of our common stock has been volatile in the past and may be volatile in the future. In 2019, the closing price of our stock on The NASDAQ Global Select Market, or NASDAQ, ranged from a low of $27.43 to a high of $51.21, and from January 1, 2020 to April 9, 2020, it ranged from a low of $39.03 to a high of $58.47. The price of our common stock may show greater volatility in the future, particularly in light of the significant increase in volatility in the stock market in general as a result of the impact of the COVID-19 pandemic and ensuing governmental actions. The trading price of our common stock is subject to significant volatility in response to numerous factors, many of which are beyond our control or may be unrelated to our operating results, and which may adversely affect the market price of our common stock, including the following:

- any decision we make to modify, qualify, withdraw or cease providing any guidance regarding our anticipated financial results for future periods, as well as potential decreased confidence in any guidance we do provide;
- the failure to meet the published expectations of securities analysts, which in the future may vary more significantly from our actual results;
- changes in financial estimates by securities analysts;
- press releases or announcements by, or changes in market values of, comparable companies;
- volatility in the markets for high-technology stocks, general stock market price and volume fluctuations, which are particularly common among securities of high-technology companies;
- stock market price and volume fluctuations attributable to inconsistent trading volume levels;
- the public perception of equity values of publicly traded companies;
- fluctuations in our results of operations; and
- the other risks and uncertainties described in this Quarterly Report on Form 10-Q, our Annual Report on Form 10-K or our other filings with the SEC.

Fluctuations in our results could cause our stock price to decline significantly. We believe that period-to-period comparisons of our results of operations may not be meaningful, and you should not rely upon them as indicators of our future performance. Future decreases in our stock price may adversely impact our ability to raise sufficient additional capital in the future, if needed.

Item 2. Unregistered Sales of Equity Securities and Use of Proceeds.

Issuer Purchases of Equity Securities

The following table provides information concerning shares of the Company's Common Stock $0.01 par value purchased during the three months ended March 28, 2020.

Period	(a) Total Number of Shares Purchased[1]	(b) Average Price Paid per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Number (or Approximate Dollar Value) of Shares that May Yet Be Purchased Under the Plans or Programs
January 1, 2020 - February 1, 2020	105,000	$53.55	105,000	$95,718,888
February 2, 2020 - February 29, 2020	87,000	$55.87	87,000	$122,965,213
March 1, 2020 - March 28, 2020	411,514	$46.37	411,514	$103,884,865
Total	603,514	$48.99	603,514	$103,884,865

[1] On February 5, 2020, the Company's Board of Directors authorized a repurchase program, effective February 16, 2020, covering up to an aggregate of $125 million of the Company's common stock, during a period of twelve months, in open market transactions and in accordance with one or more pre-arranged stock trading plans to be established in accordance with Rule 10b5-1 under the Securities Exchange Act of 1934, as amended. This repurchase program replaced the existing repurchase program, which was originally approved in February 2018 and amended in November 2018, which expired pursuant to its terms on February 15, 2020.

The Company issues common stock awards under its equity incentive plans. In the condensed consolidated financial statements, the Company treats shares of common stock withheld for tax purposes on behalf of its employees in connection with the vesting or exercise of the awards as common stock repurchases because they reduce the number of shares that would have been issued upon vesting or exercise. These withheld shares of common stock are not considered common stock repurchases under the Company's authorized common stock repurchase plan and accordingly are not included in the common stock repurchase totals in the preceding table.

Item 6. Exhibits

EXHIBIT INDEX

A. The following exhibits are incorporated by reference:

Reg. S-K Item 601(b) Reference	Document Incorporated	Referenced Document on file with the Commission
(10)	Entegris, Inc. 2019 Performance Share Award Agreement*	Exhibit 10.1 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2019
(10)	Entegris, Inc. 2019 RSU Unit Award Agreement*	Exhibit 10.2 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2019
(10)	Entegris, Inc. 2019 Stock Option Grant Agreement*	Exhibit 10.3 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2019
(10)	Amendment No. 2, dated February 5, 2020, to Executive Change in Control Termination Agreement, between Entegris Inc. and Bertrand Loy*	Exhibit 10.4 to Entegris, Inc. Annual Report on Form 10-K for the fiscal year ended December 31, 2019

* A management contract or compensatory plan

B. The Company hereby files as exhibits to this Quarterly Report on Form 10-Q the following documents:

Reg. S-K Item 601(b) Reference	Exhibit No.	Document Filed Herewith
(10)	10.1	Entegris, Inc. 2020 Performance Share Award Agreement*
(10)	10.2	Entegris, Inc. 2020 RSU Unit Award Agreement*
(10)	10.3	Entegris, Inc. 2020 Stock Option Grant Agreement*
(31)	31.1	Certification of Chief Executive Officer Pursuant to Exchange Act Rule 13a-14(a).
(31)	31.2	Certification of Chief Financial Officer Pursuant to Exchange Act Rule 13a-14(a).
(32)	32.1	Certification of Chief Executive Officer and Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
(101)	101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
(101)	101.SCH	XBRL Taxonomy Extension Schema Document
(101)	101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
(101)	101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
(101)	101.LAB	XBRL Taxonomy Extension Label Linkbase Document
(101)	101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document

* A management contract or compensatory plan

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

	ENTEGRIS, INC.
Date: April 21, 2020	/s/ Gregory B. Graves
	Gregory B. Graves Executive Vice President and Chief Financial Officer (on behalf of the registrant and as principal financial officer)

ENTEGRIS, INC.

2020 Performance-Based RSU Award Agreement

(2010 Stock Plan)

In consideration of services rendered to Entegris, Inc. (the "Company"), the Company may periodically make equity incentive awards consisting of performance-based restricted stock units with respect to the Company's Common Stock, $0.01 par value ("Stock"), to certain key employees, non-employee directors, consultants or advisors of the Company under the Company's 2010 Stock Plan (as amended from time to time, the "Plan"). Any key employee, non-employee director, consultant or advisor (a "Participant") who receives a performance-based restricted stock unit award (the "Award") is notified in writing or via email and the Award is credited to the Participant's account as reflected on the Restricted Stock Plan Overview tab under the Performance Stock Units section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com (or such other portal as the Company shall select (the "Portal")). By clicking on the "Accept" button for the Award or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company's most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I – PERFORMANCE-BASED RESTRICTED STOCK UNIT AWARD

1.1. *Award Date*. This Agreement shall take effect as of the date specified as the Award Date with respect to the Award in the Award summary provided to you online through the Portal (the "Award Date").

1.2. *Performance-based Restricted Stock Units Subject to Award*. The Award consists of that number of performance-based restricted stock units (the "PRSU") with respect to the Stock that has been approved for the Award to Participant by the Administrator as the target number of PRSUs ("Target PRSUs"). The Target PRSUs shall be subject to increase or decrease in accordance with Sections 1.3 and 1.4 below. Each PRSU is equivalent to one share of the Stock (subject to adjustment under the Plan). The Participant's rights to the PRSU are subject to the restrictions described in this Agreement and in the Plan (which is incorporated herein by reference with the same effect as if set forth herein in full) in addition to such other restrictions, if any, as may be imposed by law.

1.3. *Earned Performance-based Restricted Stock Units*. The number of PRSUs earned under this Agreement (the "Earned PRSUs") shall be equal to the Target PRSUs multiplied by the TSR Performance Multiplier (as defined herein). The "TSR Performance Multiplier" will be determined by comparing the Company's total stockholder return to the total stockholder return of each of the companies in the Comparator Peer Group (as set forth below) over the period commencing on the Award Date and ending on the third anniversary of the Award Date (the "Performance Period") to determine the Company's TSR ranking against the Comparator Group. For purposes of computing total stockholder return: **(i)**, any dividends paid by the Company or the companies in the Comparator Group shall be treated as having been reinvested at the closing price as of the ex-dividend date; and **(ii)** the beginning stock price will be the average stock price over the 20 trading days ending on the Award Date and the ending stock price will be the average stock price over the 20 trading days ending on the last day of the Performance Period (adjusted, as applicable, for stock splits, reorganizations, recapitalizations, or similar corporate transactions during such period).

1.4. *Calculation of the TSR Performance Multiplier*. The TSR Performance Multiplier will be calculated as set forth in the following table based upon the Company's total stockholder return over the Performance Period when ranked against the total stockholder return over the Performance Period of each of the companies in the Comparator Peer Group:

Company TSR Percentile Rank	**TSR Performance Multiplier**
Below 25th percentile	0
25th percentile	50%
50th percentile	100%
85th percentile or above	200%

If the Company's total stockholder return percentile rank during the Performance Period is between the 25th and the 50th percentiles or between the 50th and the 85th percentiles, the TSR Performance Multiplier will be determined using straight line interpolation based on the actual percentile ranking.

As used herein, the "Comparator Peer Group" consists of those companies that are in the Philadelphia Semiconductor Index on the Award Date; provided that, except as provided below, the common stock (or similar equity security) of each such peer company is continually listed or traded on a national securities exchange from the first day of the Performance Period through the last trading day of the Performance Period. In the event a member of the Comparator Peer Group files for bankruptcy or liquidates due to an insolvency or is delisted due to failure to meet the national securities exchange's minimum market capitalization requirement, such company shall continue to be treated as a Comparator Peer Group member, and such company's ending price will be treated as $0 if the common stock (or similar equity security) of such company is no longer listed or traded on a national securities exchange on the last trading day of the Performance Period (and if multiple members of the Comparator Peer Group file for bankruptcy or liquidate due to an insolvency or are delisted for such reason, such members shall be ranked in order of when such bankruptcy or liquidation occurs, with earlier bankruptcies, liquidations or delistings ranking lower than later bankruptcies, liquidations or delistings). In the event of a formation of a new parent company by a Comparator Peer Group member, substantially all of the assets and liabilities of which consist immediately after the transaction of the equity interests in the original Comparator Peer Group member or the assets and liabilities of such Comparator Peer Group member immediately prior to the transaction, such new parent company shall be substituted for the Comparator Peer Group member to the extent (and for such period of time) as its common stock (or similar equity securities) are listed or traded on a national securities exchange but the common stock (or similar equity securities) of the original Comparator Peer Group member are not. In the event of a merger or other business combination of two Comparator Peer Group members (including, without limitation, the acquisition of one Comparator Peer Group member, or all or substantially all of its assets, by another Comparator Peer Group member), the surviving, resulting or successor entity, as the case may be, shall continue to be treated as a member of the Comparator Peer Group, provided that the common stock (or similar equity security) of such entity is listed or traded on a national securities exchange through the last trading day of the Performance Period. With respect to the preceding two sentences, the applicable stock prices shall be equitably and proportionately adjusted to the extent (if any) necessary to preserve the intended incentives of the awards and mitigate the impact of the transaction.

The Award shall be subject to limitation that, if the Company's absolute total shareholder return is negative, then the maximum number of shares that may be earned is the Target PRSUs.

1.5. *Vesting of PRSUs*. The term "vest" as used herein with respect to any PRSU means the lapsing of the restrictions described herein with respect to such PRSU. The Award shall not be vested as of the Award Date and shall be forfeitable by the Participant without consideration or compensation in accordance with Section 1.6 below unless and until otherwise vested pursuant to the terms of this Agreement. The Participant has no rights, partial or otherwise, in the Award and/or any Stock subject thereto unless and until the Award has been earned pursuant to Section 1.3 and vested pursuant to this Section 1.5. A number of PRSUs equal to the Earned PRSUs will become 100% vested (referred to as "Vested Units") on the last day of the Performance Period (the "Maturity Date"), provided that the Participant remains continuously employed by the Company or an Affiliate through the Maturity Date. Each Vested Unit shall be settled by the delivery of one share of Stock (subject to adjustment under the Plan). Subject to Section 2.3 below, settlement will occur as soon as practicable following certification by the Administrator of the number of Earned PRSUs and passage of the Maturity Date (or, if earlier, the date the Award becomes vested pursuant to the terms of Section 1.7 below), but in no event later than the earlier of (i) 90 days following the Maturity Date (or such earlier date that the Award becomes vested), or (ii) March 15th of the year following the year in which the Award becomes vested. No fractional shares of Stock shall be issued pursuant to this Agreement.

1.6. *Forfeiture Risk*. Subject to Section 1.7, If the Participant ceases to be employed or retained by the Company or an Affiliate for any reason, any then-outstanding PRSU that is not a Vested Unit acquired by the Participant hereunder shall be automatically and immediately forfeited. The Participant hereby appoints the Company as the attorney-in-fact of the Participant to take such actions as may be necessary or appropriate to effectuate the cancellation of a forfeited PRSU.

1.7. *Early Vesting of PRSUs*. This Section sets forth the exclusive circumstances under which the Participant may become entitled to Vested Units even though he or she is not employed through the Maturity Date: **(i)** If, prior to a Change in Control, the Participant dies, incurs a total and permanent disability (as that term is defined in the Company's disability insurance policy in effect on the Award Date), or terminates employment on account of retirement from employment with the Company or an Affiliate at age 65 with ten consecutive years of employment with the Company or an Affiliate, prior to the Maturity Date, he or she shall continue to be entitled to receive the Earned PRSUs hereunder, to the extent earned as of the earlier of the Maturity Date and the date of a Change in Control, but the amount otherwise payable shall be prorated to reflect the portion of the Performance Period during which the Participant was employed. **(ii)** In the event of a Change in Control where the Award is not continued or assumed by a public company, the Earned PRSU, to the extent earned pursuant to the next sentence, shall be fully vested immediately prior to the Change in Control. The number of Earned PRSUs at the time of a Change in Control shall be determined as of the date such Change in Control is consummated, rather than the Maturity Date (as defined in Section 1.5), with the number of Earned PRSUs determined as set forth in Section 1.4 above, based upon the Company's total stockholder return and the total stockholder return of each of the companies in the Comparator Peer Group through the date of the Change in Control (and, with respect to the Company, instead of the 20-business day average, taking into account the consideration per share to be paid in the Change in Control transaction). **(iii)** In the event of a Change in Control where the Award is continued or assumed by a public company, then payment of the Earned PRSUs calculated in accordance with clause (ii) above, shall continue to be contingent on the Participant's employment through the Maturity Date unless there is a Qualifying Termination within two years following the Change in Control. If a Qualifying Termination occurs, the restrictions on all unvested Earned PRSUs shall immediately lapse. The provisions of clauses (ii) and (iii) shall govern the Award notwithstanding the provisions of any Executive Change In Control Termination Agreement (or similar agreement) that may exist between the Company or an Affiliate and the Participant. The distribution of any Vested Units occurring by reason of this Section 1.7 shall be settled by the delivery of one share of Stock (subject to adjustment under the Plan) per Vested Unit. Settlement will occur as soon as practicable following the date the Award becomes vested pursuant to the terms of this Section 1.7, but in no event later than the earlier of (A) 90 days following the date the Award becomes vested, and (B) March 15th of the year following the year in which the Award becomes vested. No fractional shares of Stock shall be issued pursuant to this Agreement.

1.8. *Nontransferability of PRSUs*. The PRSU acquired by the Participant pursuant to this Agreement shall not be sold, transferred, pledged, assigned or otherwise encumbered or disposed of except as provided below and in the Plan.

1.9. *Dividends Equivalent Rights.* The Participant shall not be entitled: **(i)** to receive any dividends or other distributions paid with respect to the Stock to which the PRSU relates, or **(ii)** to vote any Stock with respect to which the PRSU relates, unless and until, and only to the extent, the PRSU becomes vested and the Participant becomes a stockholder of record with respect to such shares of Stock. Notwithstanding the foregoing, as of each date on which the Company pays an ordinary cash dividend to record owners of shares of Stock, the Participant's account shall, as of each such dividend date, be credited with a cash amount (without interest) equal to the product of the total number of shares subject to the Target PRSU immediately prior to such dividend date multiplied by the dollar amount of the cash dividend paid per share of Stock by the Company on such dividend date (such amount, the "Dividend Equivalent Amount"). The Dividend Equivalent Amount, which shall be adjusted to reflect the number of Earned PRSUs, shall be subject to the same vesting conditions and settlement terms as the PRSU shares to which they relate.

1.10. _Sale of Vested Shares_. The Participant understands that Participant will be free to sell any Stock with respect to which the PRSU relates once the PRSU has vested and settled, subject to **(i)** satisfaction of any applicable tax withholding requirements with respect to the vesting of such PRSU; **(ii)** the completion of any administrative steps (for example, but without limitation, the transfer of certificates) that the Company may reasonably impose; and **(iii)** applicable requirements of federal and state securities laws.

1.11. _Certain Tax Matters_. The Participant expressly acknowledges that the award or vesting of the PRSU acquired hereunder may give rise to income subject to withholding. The Participant expressly acknowledges and agrees that Participant's rights hereunder are subject to Participant promptly paying to the Company all taxes required to be withheld in connection with such award, vesting, settlement and/or payment. Unless the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the vesting shares needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of vesting) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account.

1.12 _Equitable Adjustments_. The Award is subject to adjustment pursuant to Section 15.1 of the Plan.

Article II – GENERAL PROVISIONS

2.1. _Definitions_. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan. The following terms shall have the indicated meanings:

"Cause" means (a) "Cause" as defined in any individual agreement to which the Participant and the Company or an Affiliate are parties or (b) if there is no such agreement or if it does not define Cause, the Company's termination of the Participant's employment with the Company or any Affiliate following the occurrence of any one or more of the following: (i) the Participant's conviction of, or plea of guilty or nolo contendere to, a felony; (ii) the Participant's willful and continual failure to substantially perform the Participant's duties after written notification by the Company; (iii) the

Participant’s willful engagement in conduct that is materially injurious to the Company or an Affiliate monetarily or otherwise; (iv) the Participant’s commission of an act of gross misconduct in connection with the performance of the Participant’s duties; (v) the Participant’s material breach of any employment, confidentiality, or other similar agreement between the Company or an Affiliate and the Participant; or (vi) prior to a Change in Control, such other events as shall be determined by the Administrator.

“Qualifying Termination” means the termination of a Participant’s employment with the Company or an Affiliate (a) by the Company for any reason other than Cause, death, or total and permanent disability (as that term is defined in the Company’s disability insurance policy in effect on the Award Date); or (b) by the Participant because of the occurrence, without the Participant’s consent, of (i) a material reduction in the position, duties, or responsibilities of the Participant from those in effect immediately prior to such change; (ii) a reduction in the Participant’s base salary; (iii) a relocation of the Participant’s primary work location to a distance of more than 50 miles from its location as of immediately prior to such change; or (iv) a material breach by the Company or an Affiliate of any employment agreement with the Participant. In order to invoke a termination of employment pursuant to clause (b) of this definition, Participant shall provide written notice to the Company of the existence of one or more of the conditions described in clauses (i) through (iv) within 90 days following the Participant’s knowledge of the initial existence of such condition or conditions, and the Company shall have 30 days following receipt of such written notice (the “Cure Period”) during which it may remedy the condition(s). In the event that the Company fails to remedy the condition(s) covered by clause (b) of this definition during the Cure Period, the Participant must terminate employment, if at all, within 90 days following the Cure Period in order for such termination of employment to constitute a Qualifying Termination.

2.2. *No Understandings as to Employment etc*. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to employ or retain the Participant for any period or with respect to the terms of the Participant’s employment or to give rise to any right to remain in the service of the Company or any Affiliate, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.3. *Compliance with Section 409A of the Code.* Notwithstanding any other provision of the Plan or this Agreement to the contrary, the Plan and this Agreement shall be construed or deemed to be amended as necessary to remain exempt from or comply with the requirements of Section 409A of the Code and to avoid the imposition of any additional or accelerated taxes or other penalties under Section 409A of the Code. The Committee, in its sole discretion, shall determine the requirements of Section 409A of the Code applicable to the Plan and this Agreement and shall interpret the terms of each consistently therewith. Under no circumstances, however, shall the Company, an Affiliate, or a subsidiary have any liability under the Plan or this Agreement for any taxes, penalties, or interest due on amounts paid or payable pursuant to the Plan and/or this Agreement, including any taxes, penalties, or interest imposed under Section 409A of the Code. In the event that it is determined by the Company that, as a result of the deferred compensation tax rules under Section 409A of the Code (and any related regulations or other pronouncements thereunder) (the “Deferred Compensation Tax Rules”), benefits that the Participant is entitled to receive under the terms of this Agreement are deferred compensation subject to tax under the Deferred Compensation Tax Rules, (i) the Participant shall not be considered to have terminated employment for purposes hereof until the Participant would be considered to have incurred a “separation from service” within the meaning of the Deferred Compensation Tax Rules and (ii) the Company shall, in lieu of providing such benefit when otherwise due under this Agreement, instead provide such benefit on the first day on which such provision would not result in the Participant incurring any tax liability under the Deferred Compensation Tax Rules; which day, if the Participant is a “specified employee” (within the meaning of the Deferred Compensation Tax Rules), shall, in the event the benefit to be provided is due to the Participant’s “separation from service” (within the meaning of the Deferred Compensation Tax Rules) with the Company and its subsidiaries, be the first day following the six-month period beginning on the date of such separation from service. Each amount to be paid or benefit to be provided under this Agreement shall be construed as a separately identified payment for purposes of the Deferred Compensation Tax Rules, and any payments described in this Agreement that are due within the “short term deferral period” as defined in the Deferred Compensation Tax Rules shall not be treated as deferred compensation unless applicable law requires otherwise.

2.4. *Data Protection Waiver*. Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant’s participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country in which Participant works, is employed or provides services and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant’s personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant’s participation under the Plan and/or void the Award.

2.5. *Savings Clause*. In the event that Participant is employed or provides services in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company or an Affiliate, then any such term or provision shall be null, void and of no effect.

2.6. *Amendment*. The Company may amend the provisions of this Agreement at any time; provided that an amendment that would materially adversely affect the Participant's rights under this Agreement shall be subject to the written consent of the Participant. No course of conduct or failure or delay in enforcing the provisions of this Agreement shall affect the validity, binding effect or enforceability of this Agreement.

2.7. *Acts of Misconduct*. If Participant has allegedly committed an act of serious misconduct, including, but not limited to, embezzlement, fraud, dishonesty, unauthorized disclosure of trade secrets or confidential information, breach of fiduciary duty or nonpayment of an obligation owed to the Company, an executive officer of the Company may suspend Participant's rights under the Award, including the vesting of the Award and the settlement of vested PRSUs, subject to the Administrator's final decision regarding termination of the Award. No rights under the Award may be exercised during such suspension or after such termination.

2.8. *Disputes*. The Administrator or its delegate shall finally and conclusively determine any disagreement concerning the Award.

2.9. *Plan*. The terms and provisions of the Plan are incorporated herein by reference, a copy of which has been provided or made available to the Participant. In the event of a conflict or inconsistency between the terms and provisions of the Plan and the provisions of this Agreement, the Plan shall govern and control.

2.10. *Successors*. The terms of this Agreement shall be binding upon and inure to the benefit of the Company, its successors and assigns, and the Participant and the beneficiaries, executors, administrators, heirs and successors of the Participant.

2.11. *Entire Agreement*. This Agreement and the Plan contain the entire agreement and understanding of the parties hereto with respect to the subject matter contained herein and supersede all prior communications, representations and negotiations in respect thereof; provided, however, that to the extent that the Participant has entered into an employment agreement, severance agreement or change in control termination agreement with the Company that provides for vesting terms that are more favorable than the vesting terms set forth in this Agreement or the Plan, such more favorable vesting terms shall apply.

2.12 Claw Back Policy. This grant is subject to the terms of the Company's Claw Back Policy, as it may be amended, modified, superseded or replaced from time to time.

ENTEGRIS, INC.
2020 RSU Award Agreement
(2010 Stock Plan)

In consideration of services rendered to Entegris, Inc. (the "Company"), the Company may periodically make equity incentive awards consisting of restricted stock units with respect to the Company's Common Stock, $0.01 par value ("Stock"), to certain key employees, non-employee directors, consultants or advisors of the Company under the Company's 2010 Stock Plan (as amended from time to time, the "Plan"). Any key employee, non-employee director, consultant or advisor (a "Participant") who receives a restricted stock unit award (the "Award") is notified in writing or via email and the Award is credited to the Participant's account as reflected on the Overview tab under the Restricted Stock Plan section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com (or such other portal as the Company shall select (the "Portal")). By clicking on the "Accept" button for the Award in the Restricted Stock Plan section in the Overview tab or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company's most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I – RSU Award

1.1. *Award Date*. This Agreement shall take effect as of the date specified in the Restricted Stock Plan section on the Overview tab as the Award Date provided to you online through the Portal (the "Award Date").

1.2. *Restricted Stock Units Subject to Award*. The Award consists of that number of restricted stock units (the "RSU") with respect to the Stock that has been approved for the Award to Participant by the Administrator. Each RSU is equivalent to one share of the Stock. The Participant's rights to the RSU are subject to the restrictions described in this Agreement and in the Plan (which is incorporated herein by reference with the same effect as if set forth herein in full) in addition to such other restrictions, if any, as may be imposed by law.

1.3. *Meaning of Certain Terms*. The term "vest" as used herein with respect to any RSU means the lapsing of the restrictions described herein with respect to such RSU.

1.4. *Nontransferability of RSUs*. The RSU acquired by the Participant pursuant to this Agreement shall not be sold, transferred, pledged, assigned or otherwise encumbered or disposed of except as provided below and in the Plan.

1.5. *Forfeiture Risk*. Except as otherwise provided in this Agreement, if the Participant ceases to be employed or retained by the Company or an Affiliate for any reason, any then-outstanding and unvested RSU acquired by the Participant hereunder shall be automatically and immediately forfeited. The Participant hereby appoints the Company as the attorney-in-fact of the Participant to take such actions as may be necessary or appropriate to effectuate the cancellation of a forfeited RSU.

1.6. *Vesting and Settlement of RSUs*. The RSU acquired hereunder shall vest in accordance with the provisions of this Article I, Section 1.6 and applicable provisions of the Plan, as follows:

- 25% of the RSUs vest on February 19, 2021
- an additional 25% of the RSUs vest on February 19, 2022;
- an additional 25% of the RSUs vest on February 19, 2023; and
- the final 25% of the RSUs vest on February 19, 2024.

Notwithstanding the foregoing, no RSU shall vest on any vesting date specified above unless: **(A)** the Participant is then, and since the Award Date has continuously been, employed or retained by the Company or an Affiliate (subject to Sections 2.2 and 2.3); and **(B)** the Participant has fulfilled the obligations specified in Section 1.9 below. Upon vesting, each RSU shall entitle Participant to receive one share of Stock (subject to adjustment under the Plan).

Vested RSUs shall be settled in shares of Stock (or, in the discretion of the Administrator, in cash equal to the Fair Market Value thereof). Subject to Section 2.12, settlement and delivery of the applicable number of shares of Stock (or cash equivalent, if applicable) shall be made as soon as practicable following vesting, but in no event later than 30 days after the applicable vesting date. No fractional shares of Stock shall be issued pursuant to this Agreement.

1.7. *Dividend Equivalent Rights*. The Participant shall not be entitled: **(i)** to receive any dividends or other distributions paid with respect to the Stock to which the RSU relates, or **(ii)** to vote any Stock with respect to which the RSU relates, unless and until, and only to the extent, the RSU becomes vested and the Participant becomes a stockholder of record with respect to such shares of Stock. Notwithstanding the foregoing, as of each date on which the Company pays an ordinary cash dividend to record owners of shares of Stock, the Participant's account shall, as of each such dividend date, be credited with a cash amount (without interest) equal to the product of the total number of shares subject to the RSU immediately prior to such dividend date multiplied by the dollar amount of the cash dividend paid per share of Stock by the Company on such dividend date (such amount, the "Dividend Equivalent Amount"). The Dividend Equivalent Amount shall be subject to the same vesting conditions and settlement terms as the RSU shares to which they relate.

1.8. *Sale of Vested Shares*. The Participant understands that Participant will be free to sell any Stock with respect to which the RSU relates once the RSU has vested and settled, subject to **(i)** satisfaction of any applicable tax withholding requirements with respect to the vesting of such RSU; **(ii)** the completion of any administrative steps (for example, but without limitation, the transfer of certificates) that the Company may reasonably impose; and **(iii)** applicable requirements of federal and state securities laws.

1.9. *Certain Tax Matters*. The Participant expressly acknowledges that the award or vesting of the RSU acquired hereunder may give rise to income subject to withholding. The Participant expressly acknowledges and agrees that Participant's rights hereunder are subject to Participant promptly paying to the Company all taxes required to be withheld in connection with such award, vesting, settlement and/or payment. Unless the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the vesting shares needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of vesting) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account.

Article II – GENERAL PROVISIONS

2.1. *Definitions*. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan.

2.2. *Change in Control*

(a) *Assumption or Substitution*.

(i) If the Change in Control is one in which there is an acquiring or surviving entity, the Administrator may provide for the assumption or continuation of some or all outstanding Awards or for the grant of new awards in substitution therefor by the acquiror or survivor or an affiliate of the acquiror or survivor.

(ii) Only to the extent consistent with Section 409A of the Code, in the event of a Change in Control in which the successor company assumes or substitutes for the RSU (or in which the Company is the ultimate parent corporation and continues the Award), if Participant's employment with such successor company (or the Company) or an affiliate thereof is involuntarily terminated without Cause by the successor employer or Participant resigns for Good Reason, in either case within 24 months following such Change in Control: the restrictions, limitations and other conditions applicable to the RSU shall lapse and the RSU shall become free of all restrictions, limitations and conditions and become fully vested.

(b) *Awards Not Assumed or Substituted*. In the event of a Change in Control in which the successor company does not assume or substitute for the RSU (or in which the Company is the ultimate parent corporation and does not continue the Award): the restrictions, limitations and other conditions applicable to the RSU shall lapse and the RSU shall become free of all restrictions, limitations and conditions and become fully vested, provided that if the RSU constitutes nonqualified deferred compensation pursuant to Section 409A, the RSU will not be settled until the earliest to occur of the regularly scheduled vesting date, Participant's retirement in accordance with Section 2.3 and Participant's termination without Cause or for Good Reason, subject to application of a six-month delay if the Participant is a specified employee under Section 409A.

(c) *Good Reason Definition*. For purposes of this Section 2.2, "Good Reason" means (i) "Good Reason" as defined in any individual agreement to which Participant and the Company or an Affiliate are parties, or (ii) if there is no such agreement or if it does not define Good Reason, without the Participant's prior written consent: (A) a reduction in the Participant's base salary; (B) a relocation of the Participant's primary work location to a distance of more than 50 miles from its location as of immediately prior to such change; or (C) a material breach by the Company or an Affiliate of any employment agreement with the Participant. In order to invoke a termination of employment for Good Reason, a Participant shall provide written notice to the Company of the existence of one or more of the conditions described in clauses (A) through (C) within 90 days following the Participant's knowledge of the initial existence of such condition or conditions, and the Company shall have 30 days following receipt of such written notice (the "Cure Period") during which it may remedy the condition(s). In the event that the Company fails to remedy the condition(s) constituting Good Reason during the Cure Period, the Participant must terminate employment, if at all, within 90 days following the Cure Period in order for such termination to constitute a termination of employment for Good Reason.

(d) *Cause Definition*. "Cause" means (i) "Cause" as defined in any individual agreement to which the Participant and the Company or an Affiliate are parties or (ii) if there is no such agreement or if it does not define Cause, the Company's termination of the Participant's employment with the Company or any Affiliate following the occurrence of any one or more of the following: (A) the Participant's conviction of, or plea of guilty or nolo contendere to, a felony; (B) the Participant's willful and continual failure to substantially perform the Participant's duties after written notification by the Company; (C) the Participant's willful engagement in conduct that is materially injurious to the Company or an Affiliate monetarily or otherwise; (D) the Participant's commission of an act of gross misconduct in connection with the performance of the Participant's duties; or (E) the Participant's material breach of any employment, confidentiality, or other similar agreement between the Company or an Affiliates and the Participant.

2.3. *Retirement*. If Participant is an employee of the Company or Affiliate and ceases to be an employee due to retirement with the consent of the Administrator, Participant will be entitled to immediate vesting of all unvested RSUs awarded pursuant to this Agreement. As used herein the term "retirement with the consent of the Administrator" means that Participant's retirement must be with the consent of the Administrator, which consent may be granted or withheld in the discretion of the Administrator. In the event that Participant ceases to be an employee under circumstances that would otherwise qualify for retirement but the consent of the Administrator has not been granted, then Participant shall not be entitled to the benefits of this Section 2.3.

2.4. *Equitable Adjustments*. The Award is subject to adjustment pursuant to Section 15.1 of the Plan.

2.5. *No Understandings as to Employment etc*. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to employ or retain the Participant for any period or with respect to the terms of the Participant's employment or to give rise to any right to remain in the service of the Company or any Affiliate, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.6. _Data Protection Waiver_. Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant's participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country in which Participant works, is employed or provides services and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant's personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant's participation under the Plan and/or void the Award.

2.7. _Savings Clause_. In the event that Participant is employed or provides services in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company or an Affiliate, then any such term or provision shall be null, void and of no effect.

2.8. _Amendment_. The Company may amend the provisions of this Agreement at any time; provided that an amendment that would materially adversely affect the Participant's rights under this Agreement shall be subject to the written consent of the Participant. No course of conduct or failure or delay in enforcing the provisions of this Agreement shall affect the validity, binding effect or enforceability of this Agreement.

2.9. _Acts of Misconduct_. If Participant has allegedly committed an act of serious misconduct, including, but not limited to, embezzlement, fraud, dishonesty, unauthorized disclosure of trade secrets or confidential information, breach of fiduciary duty or nonpayment of an obligation owed to the Company, an executive officer of the Company may suspend Participant's rights under the Award, including the vesting of the Award and the settlement of vested RSUs, subject to the Administrator's final decision regarding termination of the award. No rights under the Award may be exercised during such suspension or after such termination.

2.10. *Disputes*. The Administrator or its delegate shall finally and conclusively determine any disagreement concerning the Award.

2.11. *Plan*. The terms and provisions of the Plan are incorporated herein by reference, a copy of which has been provided or made available to the Participant. In the event of a conflict or inconsistency between the terms and provisions of the Plan and the provisions of this Agreement, the Plan shall govern and control.

2.12. *Compliance with Section 409A of the Code*. Notwithstanding any other provision of the Plan or this Agreement to the contrary, the Plan and this Agreement shall be construed or deemed to be amended as necessary to remain exempt from or comply with the requirements of Section 409A of the Code and to avoid the imposition of any additional or accelerated taxes or other penalties under Section 409A of the Code. The Committee, in its sole discretion, shall determine the requirements of Section 409A of the Code applicable to the Plan and this Agreement and shall interpret the terms of each consistently therewith. Under no circumstances, however, shall the Company, an Affiliate, or a subsidiary have any liability under the Plan or this Agreement for any taxes, penalties, or interest due on amounts paid or payable pursuant to the Plan and/or this Agreement, including any taxes, penalties, or interest imposed under Section 409A of the Code. In the event that it is determined by the Company that, as a result of the deferred compensation tax rules under Section 409A of the Code (and any related regulations or other pronouncements thereunder) (the “Deferred Compensation Tax Rules”), benefits that the Participant is entitled to receive under the terms of this Agreement are deferred compensation subject to tax under the Deferred Compensation Tax Rules, (i) the Participant shall not be considered to have terminated employment for purposes hereof until the Participant would be considered to have incurred a “separation from service” within the meaning of the Deferred Compensation Tax Rules and (ii) the Company shall, in lieu of providing such benefit when otherwise due under this Agreement, instead provide such benefit on the first day on which such provision would not result in the Participant incurring any tax liability under the Deferred Compensation Tax Rules; which day, if the Participant is a “specified employee” (within the meaning of the Deferred Compensation Tax Rules), shall, in the event the benefit to be provided is due to the Participant’s “separation from service” (within the meaning of the Deferred Compensation Tax Rules) with the Company and its subsidiaries, be the first day following the six-month period beginning on the date of such separation from service. Each amount to be paid or benefit to be provided under this Agreement shall be construed as a separately identified payment for purposes of the Deferred Compensation Tax Rules, and any payments described in this Agreement that are due within the “short term deferral period” as defined in the Deferred Compensation Tax Rules shall not be treated as deferred compensation unless applicable law requires otherwise.

2.13. *Successors*. The terms of this Agreement shall be binding upon and inure to the benefit of the Company, its successors and assigns, and the Participant and the beneficiaries, executors, administrators, heirs and successors of the Participant.

2.14. *Entire Agreement*. This Agreement and the Plan contain the entire agreement and understanding of the parties hereto with respect to the subject matter contained herein and supersede all prior communications, representations and negotiations in respect thereof; provided, however, that to the extent that the Participant has entered into an employment agreement, severance agreement or change in control termination agreement with the Company that provides for vesting terms that are more favorable than the vesting terms set forth in this Agreement or the Plan, such more favorable vesting terms shall apply.

2.15 Claw Back Policy. This grant is subject to the terms of the Company’s Claw Back Policy, as it may be amended, modified, superseded or replaced from time to time.

ENTEGRIS, INC.
2020 Stock Option Award Agreement
(2010 Stock Plan)

In consideration of services rendered to Entegris, Inc. (the "Company"), the Company may periodically make equity incentive awards consisting of stock options with respect to the Company's Common Stock, $0.01 par value ("Stock"), to certain key employees, non-employee directors, consultants or advisors of the Company under the Company's 2010 Stock Plan (as amended from time to time, the "Plan"). Any key employee, non-employee director, consultant or advisor (a "Participant") who receives a stock option award (the "Award") is notified in writing or via email and the Award is credited to the Participant's account as reflected on the Overview tab under the Stock Options Plan section on the Morgan Stanley Stock Plan Connect web page found at https://www.stockplanconnect.com (or such other portal as the Company shall select (the "Portal")). By clicking on the "Accept" button for the Award in the Stock Options Plan section on the Overview tab or by otherwise receiving the benefits of the Award, Participant: **(i)** acknowledges that Participant has received a copy of the Plan, of the related prospectus providing information concerning awards under the Plan and of the Company's most recent Annual Report on Form 10-K; and **(ii)** accepts the Award and agrees with the Company that the Award is subject to the terms of the Plan and to the following terms and conditions:

Article I –Stock Option Grant

1.1. *Option Grant*. Effective as of the grant date specified in the Stock Options Plan section provided to you online (the "Grant Date"), the Company hereby grants Participant a non-qualified option to purchase that number of shares of Stock that has been approved for the Award to the Participant by the Administrator ("Option"). The shares of Stock awarded are specified in the Stock Options Plan section in the Granted column online through the Portal. The Option is not intended to be an incentive stock option under Section 422 of the Internal Revenue Code of 1986, as amended, and will be interpreted accordingly.

1.2. *Option Exercise Price*. The exercise (grant) price of the Option shall be 100% of the closing price of the Stock on the NASDAQ stock market on the Grant Date. The exercise price is provided to Participant online through the Portal.

1.3. *Option Vesting Schedule*. This Option shall vest and become exercisable, except as hereinafter provided, in whole or in part, as follows:

- 25% on February 19, 2021;
- an additional 25% on February 19, 2022;
- an additional 25% on February 19, 2023;
- the final 25% on February 19, 2024.

1.4. *Expiration of Option*. To the extent that the Option shall not have been exercised, this Option shall expire at 5:00 p.m. local time at the Company's headquarters on February 19, 2027 and no part of the Option may be exercised thereafter. If an expiration, termination or forfeiture date described herein falls on a weekday, Participant must exercise the Option before 5:00 p.m. local time at the Company's headquarters on that date. If an expiration, termination or forfeiture date described herein falls on a weekend or any other day on which the NASDAQ stock market is not open, Participant must exercise the Option before 5:00 p.m. local time at the Company's headquarters on the last NASDAQ business day prior to the expiration, termination or forfeiture date.

1.5. _Exercise of Option_. When and as vested, this Option may be exercised up to the number of shares of Stock specified in Section 1.1 above only by serving written notice on the designated stock plan administrator. Unless the Administrator determines otherwise, payment of the Option exercise price specified in Section 1.2 above shall be made through net share settlement procedures whereby that number of the Option shares being exercised that are needed to cover the payment of the Option exercise price (calculated using the Fair Market Value of the Company's stock on the date of exercise) shall be cancelled to fund the payment of the Option exercise price and the net shares remaining after such cancellation shall be credited to Participant's account. No fractional shares of Stock shall be issued pursuant to this Agreement. Participant will have the rights of a stockholder only after the shares of Stock have been issued to the Participant in accordance with this Agreement.

1.6. _No Assignment of Option_. This Option may not be assigned or transferred except as may otherwise be provided by the terms of this Agreement.

1.7. _Equitable Adjustments_. The Award is subject to adjustment pursuant to Section 15.1 of the Plan.

1.8. _Termination of Employment or Service with the Company_. All exercisable Options granted herein must be exercised within ninety (90) days following the date on which the employment or services of Participant with the Company or an Affiliate terminates (i.e., last day worked, excluding any severance period), or, if earlier, prior to the original expiration date of the Option ("Termination Date"), or be forfeited, except as provided in Sections 2.2 and 2.3 below and as follows:

(a) In the event of Participant's death during employment/services, each Option granted hereunder will be exercisable, whether or not vested on or prior to the date of Participant's death, until the earlier of: **(1)** the first anniversary of Participant's date of death; or **(2)** the original expiration date of the Option. In the event of Participant's death during a Special Exercise Period as specified in Section 2.3 below, each Option will continue to be exercisable in accordance with the provisions of that Section.

(b) In the event of the termination of employment/services of Participant due to Disability, Participant may exercise the Option, whether or not vested on or prior to the date of employment or service termination, at any time prior to the earlier of the original expiration date of the Option and 365 days following the later of the date of Participant's separation from service due to Participant's Disability or the date of determination of Participant's Disability, _provided_, _however_, that while the claim of Disability is pending, Options that were unvested at termination of services may not be exercised and Options that were vested at termination of services may be exercised only during the period set forth in the introductory clause to this Section

1.8. The Option shall terminate on the earlier of the original expiration date of the Option and 365 days following the later of the date of Participant's separation from service due to Participant's Disability or the date of determination of Participant's Disability, to the extent that it is unexercised. For these purposes "Disability" shall be determined in accordance with the standards and procedures of the then-current Long-Term Disability policies maintained by the Company, which is generally a physical condition arising from an illness or injury which renders an individual incapable of performing work in any occupation, as determined by the Company.

(c) If Participant's employment/services is terminated for "Cause", all granted but unexercised stock Options, whether vested or unvested, shall be forfeited on Participant's Termination Date.

1.9. *Suspension of Option Exercises*. For administrative or other reasons, the Company may, from time to time, suspend the ability of Participants to exercise options for limited periods of time. Notwithstanding the above, the Company shall not be obligated to deliver any shares of Stock during any period when the Company determines that the exercisability of the Option or the delivery of shares hereunder would violate any federal, state or other applicable laws.

1.10. *Withholding of Income Taxes*. Nonqualified stock options are subject to withholding tax upon exercise. Unless the Administrator determines otherwise, such payment of Participant's withholding tax obligations shall be made through net share settlement procedures whereby that number of the Option shares being exercised needed to cover the withholding tax obligation (calculated using the Fair Market Value of the Company's stock on the date of exercise) shall be cancelled to fund the Company's payment of the withholding tax obligation and the net shares remaining after such cancellation shall be credited to Participant's account.

Article II – GENERAL PROVISIONS

2.1. *Definitions*. Except as otherwise expressly provided, all terms used herein shall have the same meaning as in the Plan.

2.2. *Change in Control*.

(a) *Assumption or Substitution*.

(i) If the Change in Control is one in which there is an acquiring or surviving entity, the Administrator may provide for the assumption or continuation of some or all outstanding Awards or for the grant of new awards in substitution therefor by the acquiror or survivor or an affiliate of the acquiror or survivor.

(ii) In the event of a Change in Control in which the successor company assumes or substitutes for the Option (or in which the Company is the ultimate parent corporation and continues the Award), if Participant's employment with such successor company (or the Company) or an affiliate thereof is involuntarily terminated without Cause by the successor employer or Participant resigns for Good Reason, in either case within 24 months following such Change in Control: the Option will immediately vest, become fully exercisable, and may thereafter be exercised for 24 months (but in no event after the original expiration date specified in Section 1.4 above). For the purposes of this Section 2.2, the Option shall be considered assumed or substituted for if following the Change in Control the Award confers the right to purchase or receive, for each share of Stock subject to the Option immediately prior to the Change in Control, the consideration (whether stock, cash or other securities or property) received in the transaction constituting a Change in Control by holders of Stock for each Share held on the effective date of such transaction (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding Stock); *provided, however*, that if such consideration received in the transaction constituting a Change in Control is not solely common stock of the successor company, the Administrator may, with the consent of the successor company, provide that the consideration to be received upon the exercise or vesting of the Option, for each Share subject thereto, will be solely common stock of the successor company substantially equal in fair market value to the per Share consideration received by holders of Stock in the transaction constituting a Change in Control. The determination of such substantial equality of value of consideration shall be made by the Administrator in its sole discretion and its determination shall be conclusive and binding.

(b) *Awards Not Assumed or Substituted*. In the event of a Change in Control in which the successor company does not assume or substitute for the Option (or in which the Company is the ultimate parent corporation and does not continue the Award): the Option shall immediately vest and become fully exercisable.

(c) *Good Reason Definition*. For purposes of this Section 2.2, “Good Reason” means (i) “Good Reason” as defined in any individual agreement to which Participant and the Company or an Affiliate are parties, or (ii) if there is no such agreement or if it does not define Good Reason, without the Participant’s prior written consent: (A) a reduction in the Participant’s base salary; (B) a relocation of the Participant’s primary work location to a distance of more than 50 miles from its location as of immediately prior to such change; or (C) a material breach by the Company or an Affiliate of any employment agreement with the Participant. In order to invoke a termination of employment for Good Reason, a Participant shall provide written notice to the Company of the existence of one or more of the conditions described in clauses (A) through (C) within 90 days following the Participant’s knowledge of the initial existence of such condition or conditions, and the Company shall have 30 days following receipt of such written notice (the “Cure Period”) during which it may remedy the condition(s). In the event that the Company fails to remedy the condition(s) constituting Good Reason during the Cure Period, the Participant must terminate employment, if at all, within 90 days following the Cure Period in order for such termination to constitute a termination of employment for Good Reason.

(d) *Cause Definition*. “Cause” means (i) “Cause” as defined in any individual agreement to which the Participant and the Company or an Affiliate are parties or (ii) if there is no such agreement or if it does not define Cause, the Company's termination of the Participant's employment with the Company or any Affiliate following the occurrence of any one or more of the following: (A) the Participant's conviction of, or plea of guilty or nolo contendere to, a felony; (B) the Participant's willful and continual failure to substantially perform the Participant's duties after written notification by the Company; (C) the Participant's willful engagement in conduct that is materially injurious to the Company or an Affiliate monetarily or otherwise; (D) the Participant's commission of an act of gross misconduct in connection with the performance of the Participant's duties; or (E) the Participant's material breach of any employment, confidentiality, or other similar agreement between the Company or an Affiliates and the Participant.

2.3. _Retirement_. If Participant is an employee of the Company or an Affiliate and ceases to be an employee due to retirement with the consent of the Administrator, Participant will be entitled to a special exercise period with respect to the Option (the "Special Exercise Period") which will begin on Participant's retirement date and will end on the earlier of the 4^{th} anniversary of Participant's retirement date or the expiration date specified in Section 1.4 above. During the Special Exercise Period, the Option will continue to vest in accordance with the schedule specified in Section 1.3 above and will be exercisable to the same extent that it would have been exercisable had Participant remained in service with the Company or an Affiliate. As used herein the term "retirement with the consent of the Administrator" means that Participant's retirement must be with the consent of the Administrator, which consent may be granted or withheld in the discretion of the Administrator. In the event that Participant ceases to be an employee under circumstances that would otherwise qualify for retirement but the consent of the Administrator has not been granted, then Participant shall not be entitled to the benefits of this Section 2.3.

2.4. _No Understandings as to Employment, etc_. The Participant further expressly acknowledges that nothing in the Plan or any modification thereto, in the Award or in this Agreement shall constitute or be evidence of any understanding, express or implied, on the part of the Company to employ or retain the Participant for any period or with respect to the terms of the Participant's employment or to give rise to any right to remain in the service of the Company or any Affiliate, and the Participant shall remain subject to discharge to the same extent as if the Plan had never been adopted or the Award had never been made.

2.5. _Acts of Misconduct_. If Participant has allegedly committed an act of serious misconduct, including, but not limited to, embezzlement, fraud, dishonesty, unauthorized disclosure of trade secrets or confidential information, breach of fiduciary duty or nonpayment of an obligation owed to the Company, an Executive Officer of the Company may suspend Participant's rights under the Award, including the vesting of Options and the exercise of vested Options, subject to the Administrator's final decision regarding termination of the award. No rights under the Award may be exercised during such suspension or after such termination.

2.6. _Data Protection Waiver._ Participant understands and agrees that in order to process and administer the Award and the Plan, the Company and the Administrator may process personal data and/or sensitive personal information concerning the Participant. Such data and information includes, but is not limited to, the information provided in the Award grant package and any changes thereto, other appropriate personal and financial data about Participant, and information about Participant's participation in the Plan and transactions under the Plan from time to time. Participant hereby gives his or her explicit consent to the Company and the Administrator to process any such personal data and/or sensitive personal information. Participant also hereby gives his or her explicit consent to the Company and the Administrator to transfer any such personal data and/or sensitive personal data outside the country in which Participant works, is employed or provides services and to the United States. The legal persons granted access to such Participant personal data are intended to include the Company, the Administrator, the outside plan administrator as selected by the Company from time to time, and any other compensation consultant or person that the Company or the Administrator may deem appropriate for the administration of the Plan or the Award. Participant has been informed of his or her right of access and correction to Participant's personal data by contacting the Company. Participant also understands that the transfer of the information outlined herein is important to the administration of the Award and the Plan and failure to consent to the transmission of such information may limit or prohibit Participant's participation under the Plan and/or void the Award.

2.7. *Disputes*. The Administrator or its delegate shall finally and conclusively determine any disagreement concerning the Award.

2.8. *Savings Clause*. In the event that Participant is employed or provides services in a jurisdiction where the performance of any term or provision of this Agreement by the Company: **(i)** will result in a breach or violation of any statute, law, ordinance, regulation, rule, judgment, decree, order or statement of public policy of any court or governmental agency, board, bureau, body, department or authority, or **(ii)** will result in the creation or imposition of any penalty, charge, restriction, or material adverse effect upon the Company or an Affiliate, then any such term or provision shall be null, void and of no effect.

2.9. *Amendment*. The Company may amend the provisions of this Agreement at any time; provided that an amendment that would materially adversely affect the Participant's rights under this Agreement shall be subject to the written consent of the Participant. No course of conduct or failure or delay in enforcing the provisions of this Agreement shall affect the validity, binding effect or enforceability of this Agreement.

2.10. *Plan*. The terms and provisions of the Plan are incorporated herein by reference, a copy of which has been provided or made available to the Participant. In the event of a conflict or inconsistency between the terms and provisions of the Plan and the provisions of this Agreement, the Plan shall govern and control.

2.11. *Successors*. The terms of this Agreement shall be binding upon and inure to the benefit of the Company, its successors and assigns, and the Participant and the beneficiaries, executors, administrators, heirs and successors of the Participant.

2.12. *Entire Agreement*. This Agreement and the Plan contain the entire agreement and understanding of the parties hereto with respect to the subject matter contained herein and supersede all prior communications, representations and negotiations in respect thereof; provided, however, that to the extent that the Participant has entered into an employment agreement, severance agreement or change in control termination agreement with the Company that provides for vesting and/or exercise terms that are more favorable than the vesting and/or exercise terms set forth in this Agreement or the Plan, such more favorable vesting and/or exercise terms shall apply.

2.13 Claw Back Policy. This grant is subject to the terms of the Company's Claw Back Policy, as it may be amended, modified, superseded or replaced from time to time.

Exhibit 31.1

CERTIFICATIONS

I, Bertrand Loy, certify that:

1. I have reviewed this Report on Form 10-Q of Entegris, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: April 21, 2020

/s/ Bertrand Loy

Bertrand Loy
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Gregory B. Graves, certify that:

1. I have reviewed this Report on Form 10-Q of Entegris, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects, the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Dated: April 21, 2020

/s/ Gregory B. Graves

Gregory B. Graves
Chief Financial Officer
(Principal Financial Officer)

EXHIBIT 32.1

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO SECTION 906
OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Quarterly Report on Form 10-Q (the “Report”) of Entegris, Inc, a Delaware corporation (the “Company”), for the period ended March 28, 2020 as filed with the Securities and Exchange Commission on the date hereof, Bertrand Loy, President and Chief Executive Officer of the Company, and Gregory B. Graves, Chief Financial Officer of the Company, each hereby certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Dated: April 21, 2020

/s/ Bertrand Loy
Bertrand Loy
Chief Executive Officer

/s/ Gregory B. Graves
Gregory B. Graves
Chief Financial Officer